Kawasaki
Let the Good Times Roll

# Motorcycle
# Service Manual

## Ninja ZX-6R

# Quick Reference Guide


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This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

Kawasaki
Let the Good Times Roll

# ZX636J/K

# Motorcycle Service Manual

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## LIST OF ABBREVIATIONS

| | | | |
|---|---|---|---|
| A | ampere(s) | KIBS | Kawasaki intelligent antilock brake system |
| ABDC | after bottom dead center | km/h | kilometers per hour |
| ABS | antilock brake system | KTRC | Kawasaki traction control |
| AC | alternating current | KQS | Kawasaki quick shift |
| Ah | ampere hour | L | liter(s) |
| ATDC | after top dead center | LCD | liquid crystal display |
| BBDC | before bottom dead center | LED | light emitting diode |
| BDC | bottom dead center | lb | pound(s) |
| BTDC | before top dead center | m | meter(s) |
| °C | degree(s) Celsius | min | minute(s) |
| CAN | controller area network | mmHg | millimeters of mercury |
| cmHg | centimeters of mercury | mph | miles per hour |
| cu in. | cubic inch(es) | N | newton(s) |
| DC | direct current | oz | ounce(s) |
| DFI | digital fuel injection | Pa | pascal(s) |
| DOHC | double overhead camshaft | PS | horsepower |
| DOT | department of transportation | psi | pound(s) per square inch |
| ECU | electronic control unit | qt | quart(s) |
| F | farad(s) | r | revolution |
| °F | degree(s) Fahrenheit | rpm | revolution(s) per minute |
| ft | foot, feet | s | second(s) |
| g | gram(s) | TDC | top dead center |
| gal | gallon(s) | TIR | total indicator reading |
| h | hour(s) | V | volt(s) |
| HP | horsepower(s) | W | watt(s) |
| IC | integrated circuit | Ω | ohm(s) |
| in. | inch(es) | | |

## COUNTRY AND AREA CODES

| | | | |
|---|---|---|---|
| AU | Australia | SEA-B1 | Southeast Asia B1 |
| CA | Canada | SEA-B3 | Southeast Asia B3 |
| CAL | California (with Evaporative Emission Control System) | TH | Thailand |
| EUR | Europe | US | United States |
| ID | Indonesia | WVTA (FULL) | WVTA Model (Full Power) |
| PH | Philippines | | |

# EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1) and exhaust emission (2) control systems in compliance with applicable regulations of the United States Environmental Protection Agency and California Air Resources Board. Additionally, Kawasaki has incorporated an evaporative emission control system (3) in compliance with applicable regulations of the California Air Resources Board on vehicles sold in California only.

1. Crankcase Emission Control System

This system eliminates the release of crankcase vapors into the atmosphere. Instead, the vapors are routed through an oil separator to the intake side of the engine. While the engine is operating, the vapors are drawn into combustion chamber, where they are burned along with the fuel and air supplied by the fuel injection system.

2. Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this motorcycle. The fuel, ignition, and exhaust systems of this motorcycle have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

The exhaust system of this model motorcycle manufactured primarily for sale in California includes a catalytic converter system.

3. Evaporative Emission Control System

Vapors caused by fuel evaporation in the fuel system are not vented into the atmosphere. Instead, fuel vapors are routed into the running engine to be burned, or stored in a canister when the engine is stopped.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions."

"Sec. 203(a) The following acts and the causing thereof are prohibited...

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

**NOTE**

○ *The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows.*

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
2. *Tampering could include.*
   a. *Maladjustment of vehicle components such that the emission standards are exceeded.*
   b. *Use of replacement parts or accessories which adversely affect the performance or durability of the motorcycle.*
   c. *Addition of components or accessories that result in the vehicle exceeding the standards.*
   d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

**WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10 000 PER VIOLATION.**

## TAMPERING WITH NOISE CONTROL SYSTEM PROHIBITED

Federal law prohibits the following acts or the causing thereof. (1) The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below.

- Replacement of the original exhaust system or muffler with a component not in compliance with Federal regulations.
- Removal of the muffler(s) or any internal portion of the muffler(s).
- Removal of the air box or air box cover.
- Modifications to the muffler(s) or air intake system by cutting, drilling, or other means if such modifications result in increased noise levels.

# Foreword

(About this manual)
This service manual explains maintenance procedures for removing, installing, disassembling, assembling, and adjusting, as necessary, including periodic inspection and maintenance of major parts of recording models.

(Disclaimer)
1. This book does not describe all the matters concerning maintenance. This book is made for people who have basic skills and knowledge on maintenance of Kawasaki product (authorized Kawasaki dealers or other repairers). So those who do not have these skills and knowledge do not do maintenance or inspection with this manual. Skill shortage and lack of knowledge may cause maintenance troubles, parts breakage, etc.
2. All information contained in this publication is based on the latest product information available at the time of publication. No liability can be accepted for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible.
3. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.
4. The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. Please accept beforehand that the description content, illustration, photographs etc. may differ from actual vehicle due to vehicle specification change.
5. The content of the description may be changed without prior notice for vehicle specification change etc.

## How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want ignition coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Ignition Coil section.

Whenever you see symbols, heed their instructions! Always follow safe operating and maintenance practices.

**⚠ DANGER**

**DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.**

**⚠ WARNING**

**WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.**

***NOTICE***

**NOTICE is used to address practices not related to personal injury.**

This manual contains four more symbols which will help you distinguish different types of information.

**NOTE**

○*NOTE indicates information that may help or guide you in the operation or service of the vehicle.*

● Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

# General Information

## Table of Contents

Before Servicing ..... 1-2
Model Identification..... 1-7
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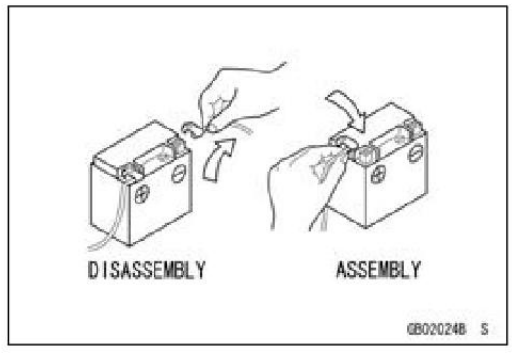
## Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a motorcycle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following.

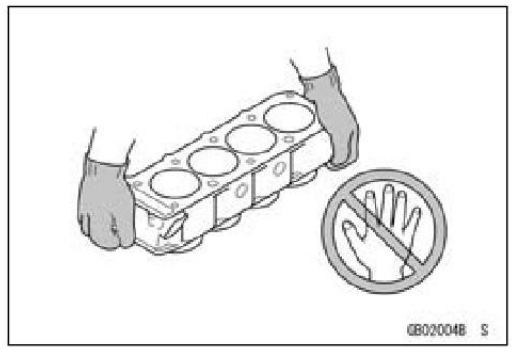
### *Battery Ground*

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground cable (–) first and then the positive (+). When completed with the service, first connect the positive (+) cable to the positive (+) terminal of the battery then the negative (–) cable to the negative terminal.



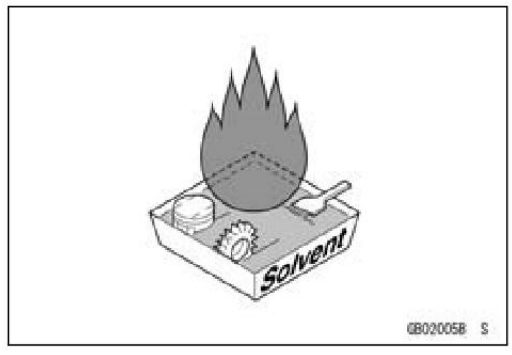

### *Edges of Parts*

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



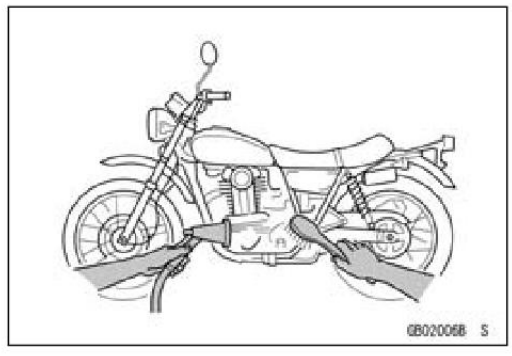

### *Solvent*

Use a high flash-point solvent when cleaning parts. High flash-point solvent should be used according to directions of the solvent manufacturer.




### *Cleaning Vehicle before Disassembly*

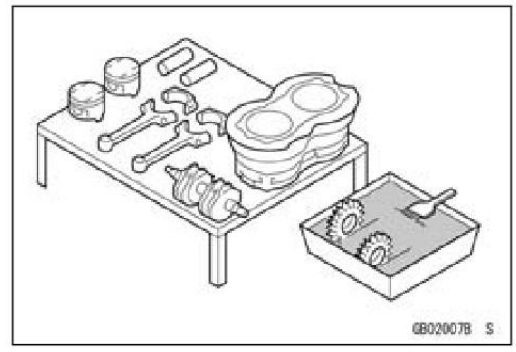
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



## Before Servicing

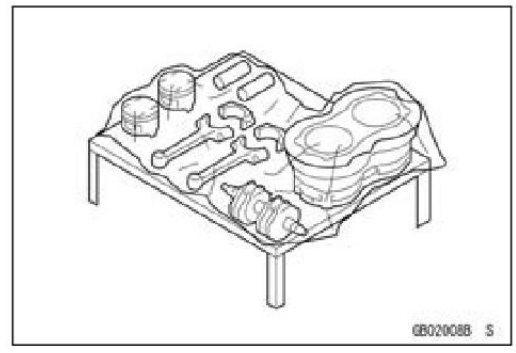
### *Arrangement and Cleaning of Removed Parts*

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



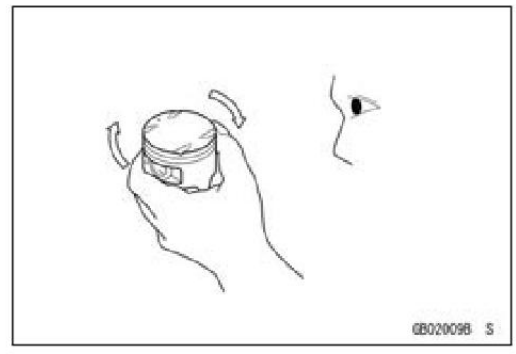

### *Storage of Removed Parts*

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



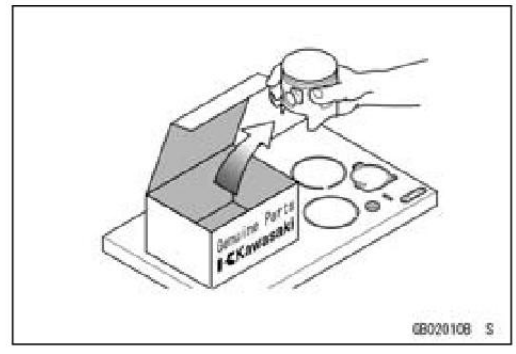

### *Inspection*

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



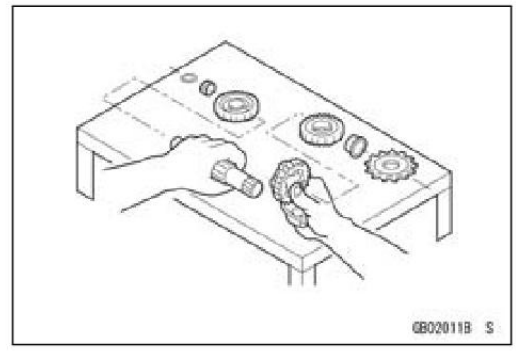

### *Replacement Parts*

Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.




### *Assembly Order*

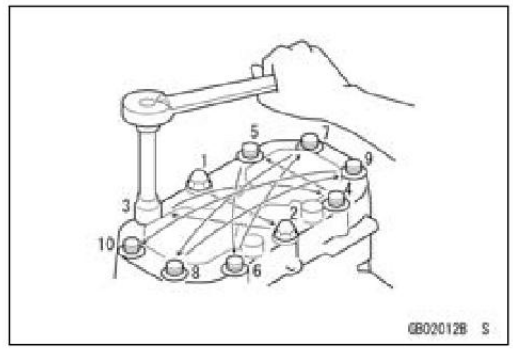
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



## Before Servicing

### *Tightening Sequence*

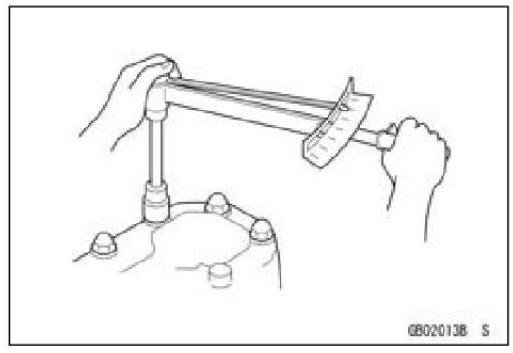
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.




### *Tightening Torque*

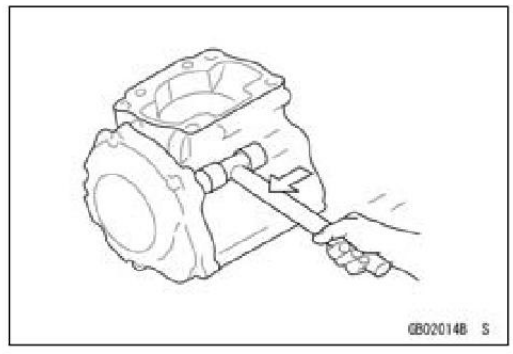
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

All of the tightening torque values are for use with dry, solvent - cleaned threads unless otherwise indicated. If a fastener which should have dry, clean threads gets contaminated with lubricant, etc., applying even the specified torque could damage it.



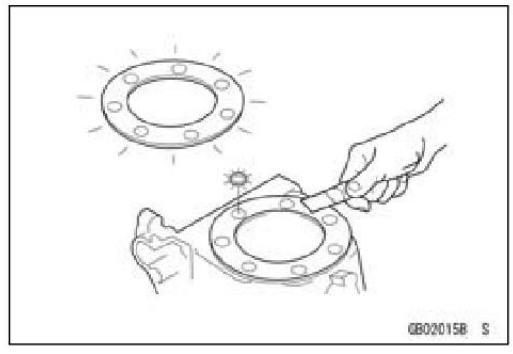

### *Force*

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non -permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



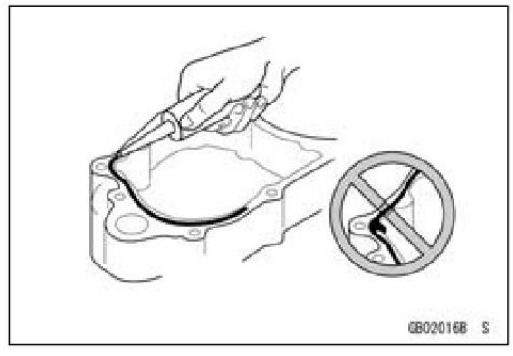

### *Gasket, O-ring*

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.




### *Liquid Gasket, Non-permanent Locking Agent*

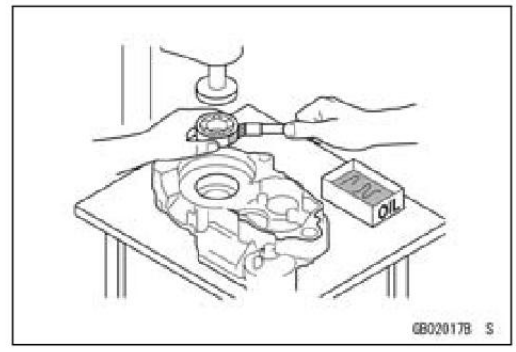
For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



## Before Servicing

### *Press*

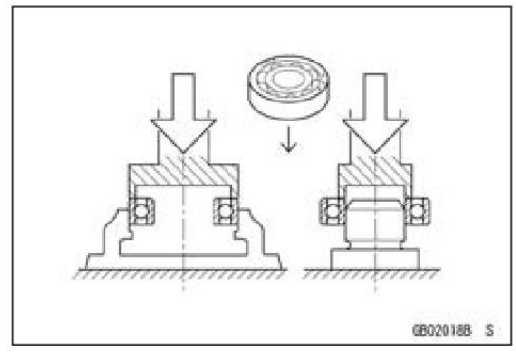
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.




### *Ball Bearing and Needle Bearing*

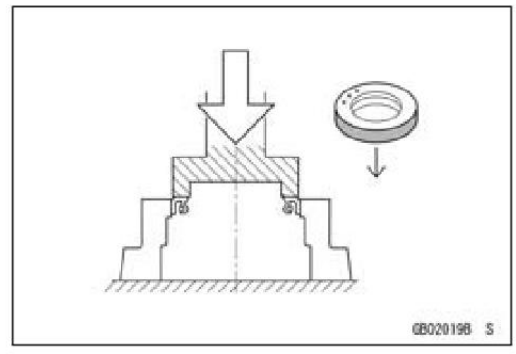
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

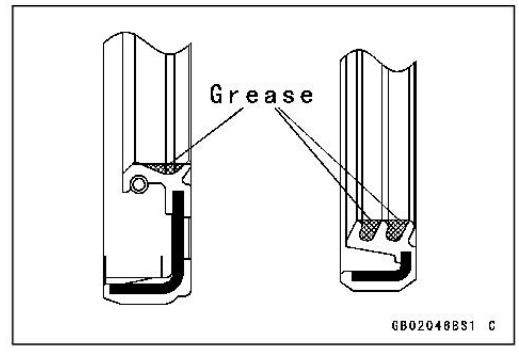



### *Oil Seal, Grease Seal*

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

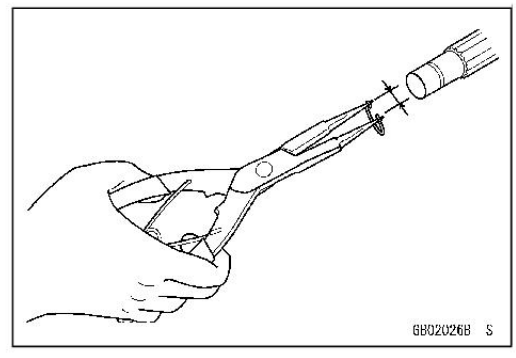



Apply specified grease to the lip of seal before installing the seal.




### *Circlips, Cotter Pins*

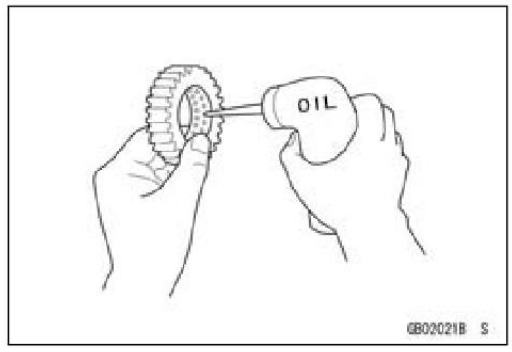
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



## Before Servicing

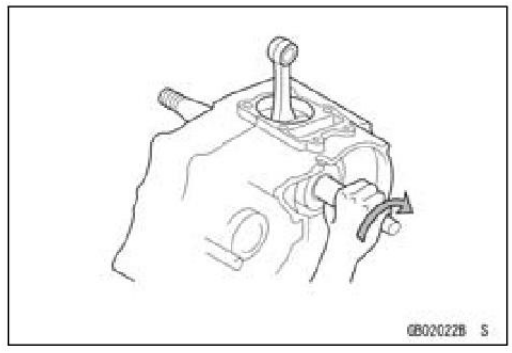
### *Lubrication*

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



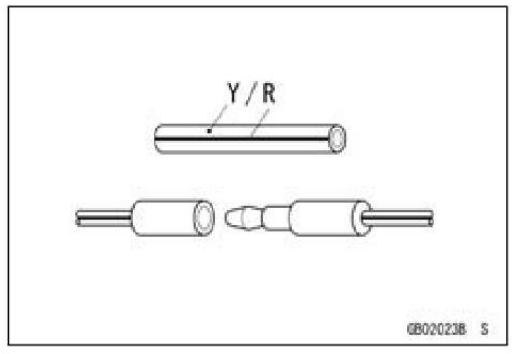

### *Direction of Engine Rotation*

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from output side).



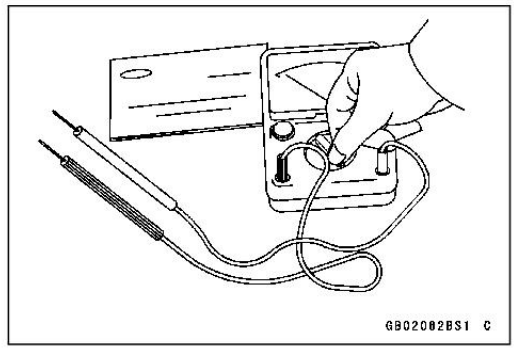

### *Electrical Wires*

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.




### *Instrument*

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.




### *Handling Electronic Parts*

Severe impacts to electronic parts such as the ECU, sensor, and relay can damage them. If dropped on a hard surface, replace such parts with new ones.

If a high voltage that is created by static electricity is applied to the electric parts, it could cause them to fail. To avoid this, touch a non-painted metal surface to discharge any static electricity that is accumulated on your body before inspecting or replacing electric parts.

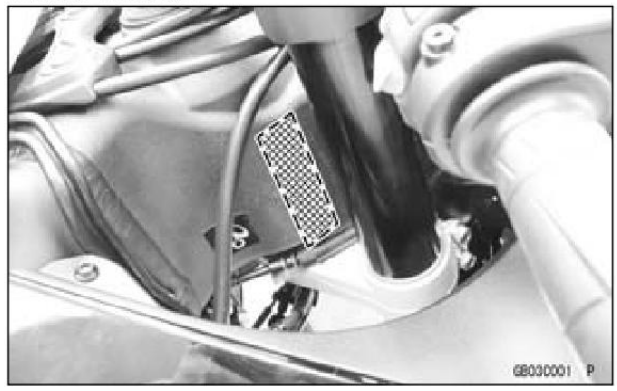
Be careful not to touch the electrical terminals of the electronic parts. The static electricity discharged from your body could damage them or deform the electrical terminals.

## Model Identification

**ZX636JR/KR Left Side View**

**ZX636JR/KR Right Side View**

**Frame Number**




**Engine Number**

## General Specifications

| Items | ZX636JRF/KRF |
|---|---|
| **Dimensions** | |
| Overall Length | 2 025 mm (79.72 in.) |
| Overall Width | 710 mm (27.95 in.) |
| Overall Height | 1 105 mm (43.50 in.) |
| Wheel Base | 1 400 mm (55.12 in.) |
| Ground Clearance | 130 mm (5.12 in.) |
| Seat Height | 830 mm (32.7 in.) |
| Curb Mass: | |
| ZX636J: | 198 kg (437 lb) |
| | (US, CA) 197 kg (434 lb) |
| Front | 102 kg (225 lb) |
| | (US, CA) 101 kg (223 lb) |
| Rear | 96 kg (212 lb) |
| ZX636K: | 195 kg (430 lb) |
| | (CAL) 196 kg (432 lb) |
| Front | 100 kg (221 lb) |
| | (CAL) 101 kg (223 lb) |
| Rear | 95 kg (209 lb) |
| Fuel Tank Capacity | 17 L (4.5 US gal) |
| **Performance** | |
| Minimum Turning Radius | 3.4 m (11.2 ft.) |
| **Engine** | |
| Type | 4-stroke, DOHC, 4-cylinder |
| Cooling System | Liquid-cooled |
| Bore and Stroke | 67.0 × 45.1 mm (2.64 × 1.78 in.) |
| Displacement | 636 cm³ (38.8 cu in.) |
| Compression Ratio | 12.9:1 |
| Maximum Horsepower | 91.0 kW (124 PS) @13 000 r/min (rpm) |
| | (SEA-B1) 84.0 kw (114 PS) @12 000 r/min (rpm) |
| | (US, CA, CAL) – – – |
| Maximum Torque | 69.0 N·m (7.0 kgf·m, 51 ft·lb) @11 000 r/min (rpm) |
| | (SEA-B3, WVTA (FULL)) 69.0 N·m (7.0 kgf·m, 51 ft·lb) @10 800 r/min (rpm) |
| | (US, CA, CAL) – – – |
| Fuel System | FI (Fuel injection), HITACHI Astemo TTK 38 × 4 |
| Fuel Type: | Unleaded gasoline |
| Minimum Octane Rating: | |
| Research Octane number (RON) | 95 |
| Starting System | Electric starter |
| Ignition System | Battery and coil (transistorized) |
| Timing Advance | Electronically advanced (digital igniter in ECU) |
| Ignition Timing | 13.5° BTDC @1 300 r/min (rpm) – 43.7° BTDC @6 750 r/min (rpm) |
| | (SEA-B3, SEA-B1, WVTA (FULL)) 13.5° BTDC @1 300 r/min (rpm) – 41.6° BTDC @7 000 r/min (rpm) |

## General Specifications

| Items | ZX636JRF/KRF |
|---|---|
| Spark Plug | NGK CR9E |
| Cylinder Numbering Method | Left to right, 1-2-3-4 |
| Firing Order | 1-2-4-3 |
| Valve Timing: | |
| Intake: | |
| Open | 41° (BTDC) |
| Close | 67° (ABDC) |
| Duration | 288° |
| Exhaust: | |
| Open | 50° (BBDC) |
| Close | 22° (ATDC) |
| Duration | 253° |
| Lubrication System | Forced lubrication (wet sump) |
| Engine Oil: | |
| Grade | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 |
| Viscosity | SAE 10W-40 |
| Capacity | 3.6 L (3.8 US qt) |
| **Drive Train** | |
| Primary Reduction System: | |
| Type | Gear |
| Reduction Ratio | 1.900 (76/40) |
| Clutch Type | Wet multi disc |
| Transmission: | |
| Type | 6-speed, constant mesh, return shift |
| Gear Ratios: | |
| 1st | 2.846 (37/13) |
| 2nd | 2.200 (33/15) |
| 3rd | 1.850 (37/20) |
| 4th | 1.600 (32/20) |
| 5th | 1.421 (27/19) |
| 6th | 1.300 (26/20) |
| Final Drive System: | |
| Type | Chain drive |
| Reduction Ratio | 2.867 (43/15) |
| Overall Drive Ratio | 7.081 @Top gear |
| **Frame** | |
| Type | Tubular, diamond |
| Caster (Rake Angle) | 23.5° |
| Trail | 101 mm (3.98 in.) |
| Front Tire: | |
| Type | Tubeless |
| Size | 120/70 ZR17 M/C (58W) |
| Rim Size | 17M/C × MT3.50 |

## General Specifications

| Items | ZX636JRF/KRF |
|---|---|
| Rear Tire: | |
| Type | Tubeless |
| Size | 180/55 ZR17 M/C (73W) |
| Rim Size | 17M/C × MT5.50 |
| Front Suspension: | |
| Type | Telescopic fork (upside-down) |
| Wheel Travel | 120 mm (4.72 in.) |
| Rear Suspension: | |
| Type | Swingarm (uni-trak) |
| Wheel Travel | 151 mm (5.94 in.) |
| Brake Type: | |
| Front | Dual discs |
| Rear | Single disc |
| **Electrical Equipment** | |
| Battery | 12 V 8 Ah (10 HR) |
| Headlight: | |
| High Beam | LED |
| Low Beam | LED |
| City Light | LED |
| Tail/Brake Light | LED |
| Turn Signal Light | LED |
| License Plate Light | LED |
| Alternator: | |
| Type | Three-phase AC |
| Maximum Output | 14.0 V - 26.0 A @5 000 r/min (rpm) |

Specifications are subject to change without notice, and may not apply to every country.

## Unit Conversion Table

### Prefixes for Units:

| Prefix | Symbol | Power |
|---|---|---|
| mega | M | × 1 000 000 |
| kilo | k | × 1 000 |
| centi | c | × 0.01 |
| milli | m | × 0.001 |
| micro | μ | × 0.000001 |

### Units of Mass:

| | | | | |
|---|---|---|---|---|
| kg | × | 2.205 | = | lb |
| g | × | 0.03527 | = | oz |

### Units of Volume:

| | | | | |
|---|---|---|---|---|
| L | × | 0.2642 | = | gal (US) |
| L | × | 0.2200 | = | gal (IMP) |
| L | × | 1.057 | = | qt (US) |
| L | × | 0.8799 | = | qt (IMP) |
| L | × | 2.113 | = | pint (US) |
| L | × | 1.816 | = | pint (IMP) |
| mL | × | 0.03381 | = | oz (US) |
| mL | × | 0.02816 | = | oz (IMP) |
| mL | × | 0.06102 | = | cu in. |

### Units of Force:

| | | | | |
|---|---|---|---|---|
| N | × | 0.1020 | = | kg |
| N | × | 0.2248 | = | lb |
| kg | × | 9.807 | = | N |
| kg | × | 2.205 | = | lb |

### Units of Length:

| | | | | |
|---|---|---|---|---|
| km | × | 0.6214 | = | mile |
| m | × | 3.281 | = | ft |
| mm | × | 0.03937 | = | in. |

### Units of Torque:

| | | | | |
|---|---|---|---|---|
| N·m | × | 0.1020 | = | kgf·m |
| N·m | × | 0.7376 | = | ft·lb |
| N·m | × | 8.851 | = | in·lb |
| kgf·m | × | 9.807 | = | N·m |
| kgf·m | × | 7.233 | = | ft·lb |
| kgf·m | × | 86.80 | = | in·lb |

### Units of Pressure:

| | | | | |
|---|---|---|---|---|
| kPa | × | 0.01020 | = | kgf/cm² |
| kPa | × | 0.1450 | = | psi |
| kPa | × | 0.7501 | = | cmHg |
| kgf/cm² | × | 98.07 | = | kPa |
| kgf/cm² | × | 14.22 | = | psi |
| cmHg | × | 1.333 | = | kPa |

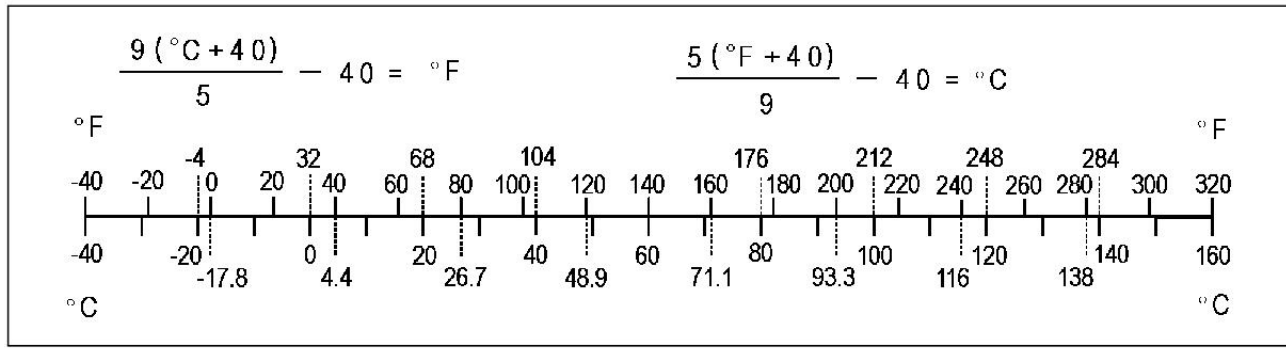
### Units of Speed:

| | | | | |
|---|---|---|---|---|
| km/h | × | 0.6214 | = | mph |

### Units of Power:

| | | | | |
|---|---|---|---|---|
| kW | × | 1.360 | = | PS |
| kW | × | 1.341 | = | HP |
| PS | × | 0.7355 | = | kW |
| PS | × | 0.9863 | = | HP |

### Units of Temperature:



# Periodic Maintenance

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## Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition.**The initial maintenance is vitally important and must not be neglected.**

**Periodic Inspection**

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.
*B: For higher odometer readings, repeat at the frequency interval established here.
*C: Service more frequently when operating in severe conditions: dusty, wet, muddy, high speed, or frequent starting/stopping.
*D: Other than US Model
○: Emission Related Item
Q: Inspection
: Change or Replace
: Lubrication

| | Items | year (*A) | Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6) | 12 (7.6) | 24 (15.2) | 36 (22.8) | 48 (30.4) | See Page |
|---|---|---|---|---|---|---|---|---|
| **Fuel System** | | | | | | | | |
| ○ | Air cleaner element (*C) | | | | | | | 2-16 |
| ○ | Idle speed | | Q | Q | Q | Q | Q | 2-17 |
| ○ | Throttle control system (play, smooth return, no drag) | Q:1 | Q | Q | Q | Q | Q | 2-17 |
| ○ | Engine vacuum synchronization | | | Q | Q | Q | Q | 2-18 |
| | Fuel system | Q:1 | Q | Q | Q | Q | Q | 2-21 |
| | Fuel filter | | | | | | | 2-22 |
| | Fuel hose | :5 | | | | | | 2-24 |
| ○ | Evaporative emission control system (*D) | | | | Q | | Q | 2-26 |
| **Cooling System** | | | | | | | | |
| | Cooling system | Q:1 | Q | Q | Q | Q | Q | 2-27 |
| | Coolant, water hose and O-ring | :3 | | | | | | 2-27, 2-30 |
| **Engine Top End** | | | | | | | | |
| ○ | Valve clearance | | | Q | Q | Q | Q | 2-31 |
| ○ | Air suction system | | | Q | Q | Q | Q | 2-34 |
| **Clutch** | | | | | | | | |
| | Clutch operation (play, engagement, disengagement) | Q:1 | Q | Q | Q | Q | Q | 2-35 |
| **Engine Lubrication System** | | | | | | | | |
| | Engine oil (*C) and oil filter | :1 | | | | | | 2-36, 2-37 |
| **Wheels and Tires** | | | | | | | | |
| | Wheel bearing damage | Q:1 | | Q | Q | Q | Q | 2-39 |
| **Final Drive** | | | | | | | | |
| | Drive chain wear (*C) | | | Q | Q | Q | Q | 2-42 |
| | Drive chain guide wear | | | Q | Q | Q | Q | 2-42 |

## Periodic Maintenance Chart

| Items | | year (*A) | Odometer Reading (*B) × 1 000 km (× 1 000 mile) | | | | | See Page |
|---|---|---|---|---|---|---|---|---|
| | | | 1 (0.6) | 12 (7.6) | 24 (15.2) | 36 (22.8) | 48 (30.4) | |
| **Brakes** | | | | | | | | |
| | Brake system | Q:1 | Q | Q | Q | Q | Q | 2-43 |
| | Brake operation (effectiveness, play, no drag) | Q:1 | Q | Q | Q | Q | Q | 2-43 |
| | Brake fluid (front and rear) | :2 | | | | | | 2-45 |
| | Brake hose | :4 | | | | | | 2-47 |
| | Rubber parts of brake master cylinder and caliper | :4 | | | | | | 2-49, 2-51 |
| **Suspension** | | | | | | | | |
| | Suspension system | Q:1 | | Q | Q | Q | Q | 2-56 |
| **Steering** | | | | | | | | |
| | Steering play | Q:1 | Q | Q | Q | Q | Q | 2-57 |
| | Steering stem bearing | :2 | | | | | | 2-59 |
| **Electrical System** | | | | | | | | |
| | Electrical system | Q:1 | | Q | Q | Q | Q | 2-59, 2-61, 2-62, 2-63 |
| ○ | Spark plug | | | | | | | 2-63 |
| **Others** | | | | | | | | |
| | Chassis parts | :1 | | | | | | 2-64 |
| | Condition of bolts, nuts and fasteners | | Q | Q | Q | Q | Q | 2-65 |

## Daily Checks

**NOTE**

○*Daily maintenance items should also be checked at every scheduled dealer service.*

| Daily Maintenance Items | | See Page |
|---|---|---|
| Fuel | Adequate supply in tank, no leaks | – |
| Engine oil | Oil level between level lines | – |
| Tires | Air pressure (when cold), install the air valve cap | 2-38 |
| | Tire wear | 2-38 |
| Drive chain | Slack: every 1 000 km (600 mile) | 2-40 |
| | Lubricate: every 600 km (400 mile) | 2-39 |
| Bolts, nuts and fasteners | Check for loose and/or missing bolts, nuts and fasteners | 2-65 |
| Steering | Action smooth but not loose from lock to lock | – |
| | No binding of control cables | – |
| Brakes | Brake pad wear | 2-54 |
| | Brake fluid level | 2-44 |
| | No brake fluid leakage | 2-43 |
| Throttle | Throttle grip free play | 2-17 |
| Clutch | Clutch lever free play | 2-35 |
| | Clutch lever operates smoothly | 2-35 |
| Coolant | No coolant leakage | 2-27 |
| | Coolant level between level lines (when engine is cold) | 2-27 |
| Electrical equipment | All lights (head, city, brake/tail, turn signal, license plate, warning/indicator) meter and horn work | 2-59 |
| Engine stop switch | Stops engine | 2-63 |
| Side stand | Return to its fully up position by spring tension | – |
| | Return spring not weak or not damaged | – |
| Rear view mirrors | Rear view sight | – |

## Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc. All of the values are for use with dry solvent - cleaned threads unless otherwise indicated.

Letters used in the “Remarks” column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent).
*L: Apply a non-permanent locking agent (Three Bond: TB1360G or equivalent).
LG: Apply liquid gasket.
Lh: Left-hand Threads
LN: Apply a non-permanent locking agent (High Strength: Loctite 648 or equivalent).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

| Fastener | Torque | | | Remarks |
|---|---|---|---|---|
| | N·m | kgf·m | ft·lb | |
| **Fuel System (DFI)** | | | | |
| Throttle Case Bolts | 2.4 | 0.24 | 21 in·lb | |
| Throttle Cable Holding Plate Bolt | 4.0 | 0.41 | 35 in·lb | R |
| Throttle Body Assy Holder Clamp Bolts | 3.0 | 0.31 | 27 in·lb | |
| Delivery Pipe Screws | 3.4 | 0.35 | 30 in·lb | |
| Throttle Body Assy Holder Bolts | 12 | 1.2 | 106 in·lb | R |
| Air Intake Duct Assembly Screws | 3.0 | 0.31 | 27 in·lb | |
| Air Intake Duct Bolts | 10 | 1.0 | 89 in·lb | R |
| Air Cleaner Housing Clamp Bolts | 1.5 | 0.15 | 13 in·lb | |
| Fuel Pump Assembly Screws | 0.98 | 0.10 | 8.7 in·lb | R |
| Fuel Pump Bolts | 10 | 1.0 | 89 in·lb | R, S |
| Vehicle-down Sensor Bolts | 6.0 | 0.61 | 53 in·lb | |
| **Cooling System** | | | | |
| Radiator Bolts (Upper) | 10 | 1.0 | 89 in·lb | |
| Water Hose Fitting | 9.0 | 0.92 | 80 in·lb | R |
| Water Temperature Sensor | 12 | 1.2 | 106 in·lb | |
| Thermostat Cover Bolts | 6.0 | 0.61 | 53 in·lb | |
| Oil Cooler Bolts | 20 | 2.0 | 15 | |
| Coolant Drain Bolt (Cylinder) | 10 | 1.0 | 89 in·lb | |
| Water Hose Fitting Bolts | 10 | 1.0 | 89 in·lb | |
| Water Pump Impeller Bolt | 10 | 1.0 | 89 in·lb | |
| Water Pump Cover Bolts | 12 | 1.2 | 106 in·lb | R |
| Coolant Drain Bolt (Water Pump) | 9.0 | 0.92 | 80 in·lb | |
| **Engine Top End** | | | | |
| Air Suction Valve Cover Bolts | 10 | 1.0 | 89 in·lb | R |
| Spark Plugs | 13 | 1.3 | 115 in·lb | |
| Cylinder Head Cover Bolts | 10 | 1.0 | 89 in·lb | S |
| Breather Hose Fitting | 15 | 1.5 | 11 | R |

## Torque and Locking Agent

| Fastener | Torque | | | Remarks |
|---|---|---|---|---|
| | N·m | kgf·m | ft·lb | |
| Camshaft Sprocket Bolts | 15 | 1.5 | 11 | LN |
| Camshaft Cap Bolts, First | 6.0 | 0.61 | 53 in·lb | S |
| Camshaft Cap Bolts, Final | 12 | 1.2 | 106 in·lb | S |
| Cylinder Head Bolts (M9) | see the text | ← | ← | MO, S |
| Cylinder Head Water Jacket Plugs | 19.6 | 2.0 | 14.5 | R |
| Cylinder Head Bolts (M6) | 12 | 1.2 | 106 in·lb | S |
| Front Camshaft Chain Guide Bolt (Upper) | 25 | 2.5 | 18 | |
| Front Camshaft Chain Guide Bolt (Lower) | 12 | 1.2 | 106 in·lb | |
| Camshaft Chain Tensioner Bolts | 11 | 1.1 | 97 in·lb | |
| Camshaft Chain Tensioner Cap Bolt | 20 | 2.0 | 15 | |
| Starter Motor Clutch Bolt Cap | 3.0 | 0.31 | 27 in·lb | |
| Timing Inspection Cap | 3.0 | 0.31 | 27 in·lb | |
| Exhaust Butterfly Valve Actuator Pulley Bolt | 5.0 | 0.51 | 44 in·lb | |
| Exhaust Butterfly Valve Cable Locknuts | 5.0 | 0.51 | 44 in·lb | |
| Muffler Body Bolt | 25 | 2.5 | 18 | |
| Muffler Body End Cover Bolts | 7.0 | 0.71 | 62 in·lb | *L |
| Muffler Cover Bolts | 7.0 | 0.71 | 62 in·lb | |
| Exhaust Pipe Holder Nuts | 20 | 2.0 | 15 | S |
| Oxygen Sensor | 25 | 2.5 | 18 | |
| Exhaust Pipe Clamp Bolt | 20 | 2.0 | 15 | |
| Premuffler Chamber Bolt | 40 | 4.1 | 30 | |
| Premuffler Chamber Bracket Bolt | 40 | 4.1 | 30 | |
| Muffler Body Clamp Bolt | 20 | 2.0 | 15 | |
| **Clutch** | | | | |
| Clutch Hub Nut | 135 | 13.8 | 100 | R |
| Clutch Cover Bolts (L = 40 mm) | 10 | 1.0 | 89 in·lb | |
| Clutch Stopper Bolts | 9.0 | 0.92 | 80 in·lb | |
| Clutch Cover Bolts (L = 25 mm) | 10 | 1.0 | 89 in·lb | |
| **Engine Lubrication System** | | | | |
| Oil Filter | 17 | 1.7 | 13 | R |
| Oil Filter Pipe | 25 | 2.5 | 18 | L |
| Oil Filter Guard Bolts | 4.0 | 0.41 | 35 in·lb | R |
| Oil Cooler/Oil Filter Case Bolts | 20 | 2.0 | 15 | R |
| Air Bleed Bolt | 10 | 1.0 | 89 in·lb | |
| Oil Cooler Bolts | 20 | 2.0 | 15 | |
| Oil Pump Driven Gear Bolt | 10 | 1.0 | 89 in·lb | R |
| Oil Pressure Switch Terminal Bolt | 2.0 | 0.20 | 18 in·lb | |
| Oil Pressure Switch | 15 | 1.5 | 11 | LG |
| Oil Pressure Relief Valve | 15 | 1.5 | 11 | L |
| Engine Oil Drain Bolt | 29 | 3.0 | 21 | |
| Oil Pan Bolts | 10 | 1.0 | 89 in·lb | S |
| **Engine Removal/Installation** | | | | |
| Front Engine Mounting Bolts | 45 | 4.6 | 33 | S |

## Torque and Locking Agent

| Fastener | Torque | | | Remarks |
|---|---|---|---|---|
| | N·m | kgf·m | ft·lb | |
| Adjusting Collar (Middle) | 10 | 1.0 | 89 in·lb | S |
| Adjusting Collar Locknuts | 50 | 5.1 | 37 | S |
| Engine Mounting Nut (Middle) | 45 | 4.6 | 33 | R, S |
| Engine Mounting Nut (Lower) | 45 | 4.6 | 33 | R, S |
| Adjusting Collar (Lower) | 10 | 1.0 | 89 in·lb | M, S |
| **Crankshaft/Transmission** | | | | |
| Breather Hose Fitting | 15 | 1.5 | 11 | R |
| Oil Jet Nozzles | 3.0 | 0.31 | 27 in·lb | |
| Race Holder Screws | 5.0 | 0.51 | 44 in·lb | R |
| Transmission Case Bolts (M8) | 20 | 2.0 | 15 | |
| Transmission Case Bolt (M6) | 10 | 1.0 | 89 in·lb | |
| Bearing Holder Screws | 5.0 | 0.51 | 44 in·lb | R |
| Connecting Rod Big End Nuts | see the text | ← | ← | |
| Breather Plate Bolts | 10 | 1.0 | 89 in·lb | R |
| Oil Passage Plugs | 20 | 2.0 | 15 | R |
| Oil Passage Nozzle | 5.0 | 0.51 | 44 in·lb | |
| Oil Passage Plug (M25) | 17 | 1.7 | 13 | |
| Crankcase Bolts (M6, L = 68 mm) | 12 | 1.2 | 106 in·lb | |
| Crankcase Bolt (M8, L = 90 mm) | 27 | 2.8 | 20 | |
| Crankcase Bolts (M8, L = 75 mm) | 27 | 2.8 | 20 | |
| Crankcase Bolts (M6, L = 50 mm) | 12 | 1.2 | 106 in·lb | |
| Crankcase Bolts (M8, L = 97 mm), First | 15 | 1.5 | 11 | MO, S |
| Crankcase Bolts (M8, L = 97 mm), Final | 31 | 3.2 | 23 | MO, S |
| Shift Drum Cam Holder Bolt | 12 | 1.2 | 106 in·lb | R |
| Shift Shaft Return Spring Pin | 29 | 3.0 | 21 | R |
| Gear Positioning Lever Bolt | 12 | 1.2 | 106 in·lb | |
| Starter Motor Clutch Cover Bolts (L = 30 mm) | 10 | 1.0 | 89 in·lb | |
| Starter Motor Clutch Cover Bolt (L = 20 mm) | 10 | 1.0 | 89 in·lb | |
| Idle Gear Cover Bolts | 10 | 1.0 | 89 in·lb | |
| Quick Shifter Tie-Rod Locknuts | 7.0 | 0.71 | 62 in·lb | Lh (1) |
| Shift Pedal Bolt | 25 | 2.5 | 18 | G, R |
| Starter Motor Clutch Bolt | 49 | 5.0 | 36 | |
| **Wheels/Tires** | | | | |
| Front Axle Clamp Bolts | 20 | 2.0 | 15 | S |
| Front Axle | 130 | 13.3 | 95.9 | |
| Rear Axle Nut | 130 | 13.3 | 95.9 | |
| **Final Drive** | | | | |
| Engine Sprocket Cover Bolts | 10 | 1.0 | 89 in·lb | |
| Engine Sprocket Cover Damper Screws | 3.5 | 0.36 | 31 in·lb | |
| Chain Guide Bolts | 12 | 1.2 | 106 in·lb | R |
| Engine Sprocket Nut | 147 | 15.0 | 108 | MO |
| Rear Sprocket Nuts | 60 | 6.1 | 44 | R, S |
| Rear Axle Nut | 130 | 13.3 | 95.9 | |

## Torque and Locking Agent

| Fastener | Torque | | | Remarks |
|---|---|---|---|---|
| | N·m | kgf·m | ft·lb | |
| **Brakes** | | | | |
| Front Brake Reservoir Bracket Bolt | 9.0 | 0.92 | 80 in·lb | |
| Front Brake Reservoir Cap Stopper Screw | 1.2 | 0.12 | 11 in·lb | |
| Brake Lever Pivot Bolt | 1.0 | 0.10 | 8.9 in·lb | Si |
| Brake Lever Pivot Bolt Locknut | 5.9 | 0.60 | 52 in·lb | |
| Front Brake Light Switch Screw | 1.2 | 0.12 | 11 in·lb | |
| Bleed Valves | 8.0 | 0.82 | 71 in·lb | |
| Front Master Cylinder Clamp Bolts | 11 | 1.1 | 97 in·lb | S |
| Brake Hose Banjo Bolts | 25 | 2.5 | 18 | |
| Brake Pipe Joint Nuts | 14.5 | 1.48 | 10.7 | |
| Brake Pipe Banjo Bolts | 23 | 2.3 | 17 | |
| Front Caliper Bolts | 35 | 3.6 | 26 | |
| Front Brake Pad Pins | 17.2 | 1.75 | 12.7 | |
| Wheel Rotation Sensor Bolt | 8.0 | 0.82 | 71 in·lb | |
| Brake Disc Bolts | 28 | 2.9 | 21 | R, S |
| Brake Pipe Banjo Bolts | 23 | 2.3 | 17 | |
| Brake Pipe Joint Nut | 14.5 | 1.48 | 10.7 | |
| Brake Hose Banjo Bolts | 25 | 2.5 | 18 | |
| Rear Master Cylinder Bolts | 25 | 2.5 | 18 | |
| Brake Pedal Bolt | 35 | 3.6 | 26 | R |
| Rear Master Cylinder Push Rod Locknut | 17.2 | 1.75 | 12.7 | |
| Rear Caliper Pin Bolt | 27 | 2.8 | 20 | Si |
| Rear Brake Pad Pin | 17.2 | 1.75 | 12.7 | |
| Rear Brake Pad Pin Plug | 2.5 | 0.25 | 22 in·lb | |
| Brake Disc Bolts | 28 | 2.9 | 21 | R, S |
| **Suspension** | | | | |
| Front Fork Clamp Bolts (Upper) | 20 | 2.0 | 15 | S |
| Front Fork Clamp Bolts (Lower) | 25 | 2.5 | 18 | AL |
| Front Fork Top Plugs | 35 | 3.6 | 26 | |
| Piston Rod Guide Case | 90 | 9.2 | 66 | |
| Rear Shock Absorber Bracket Nut | 60 | 6.1 | 44 | |
| Swingarm Pivot Shaft Nut | 110 | 11.2 | 81.1 | S |
| Swingarm Pivot Adjusting Collar | 20 | 2.0 | 15 | S |
| Swingarm Pivot Adjusting Collar Locknut | 100 | 10.2 | 73.8 | S |
| Rear Shock Absorber Nuts | 35 | 3.6 | 26 | R |
| Tie-Rod Nuts | 60 | 6.1 | 44 | R |
| Rocker Arm Bolt | 35 | 3.6 | 26 | |
| **Steering** | | | | |
| Handlebar Clamp Bolts | 25 | 2.5 | 18 | |
| Handlebar Positioning Bolts | 10 | 1.0 | 89 in·lb | R |
| Throttle Case Bolts | 2.4 | 0.24 | 21 in·lb | |
| Handlebar End Bolts | 25 | 2.5 | 18 | R |
| Switch Housing Screws | 2.4 | 0.24 | 21 in·lb | S |

## Torque and Locking Agent

| Fastener | Torque | | | Remarks |
|---|---|---|---|---|
| | N·m | kgf·m | ft·lb | |
| Steering Stem Head Bolt | 80 | 8.2 | 59 | S |
| Front Fork Clamp Bolts (Upper) | 20 | 2.0 | 15 | S |
| Steering Stem Nut | 28 | 2.9 | 21 | |
| Front Fork Clamp Bolts (Lower) | 25 | 2.5 | 18 | AL |
| **Frame** | | | | |
| Rear Frame Bolts (M10) | 45 | 4.6 | 33 | R |
| Front Footpeg Bracket Bolts | 25 | 2.5 | 18 | |
| Rear Master Cylinder Bolts | 25 | 2.5 | 18 | |
| Front Footpeg Bolts | 35 | 3.6 | 26 | R |
| Side Stand Switch Bolt | 9.0 | 0.92 | 80 in·lb | R |
| Side Stand Bracket Bolts | 50 | 5.1 | 37 | R |
| Side Stand Nut | 45 | 4.6 | 33 | R, S |
| Side Stand Bolt | 30 | 3.1 | 22 | S |
| Rear Footpeg Bracket Bolts | 25 | 2.5 | 18 | |
| Rear Frame Bolts (M8) | 25 | 2.5 | 18 | R |
| Front Side Reflector Nuts | 3.4 | 0.35 | 30 in·lb | |
| **Electrical System** | | | | |
| Switch Housing Screws | 2.4 | 0.24 | 21 in·lb | S |
| Front Brake Light Switch Screw | 1.2 | 0.12 | 11 in·lb | |
| Crankshaft Sensor Bolts | 6.0 | 0.61 | 53 in·lb | |
| Starter Motor Clutch Cover Bolt (L = 30 mm) | 10 | 1.0 | 89 in·lb | |
| Starter Motor Clutch Cover Bolt (L = 20 mm) | 10 | 1.0 | 89 in·lb | |
| Idle Gear Cover Bolts | 10 | 1.0 | 89 in·lb | |
| Starter Motor Clutch Bolt | 49 | 5.0 | 36 | |
| Oil Pressure Switch | 15 | 1.5 | 11 | LG |
| Oil Pressure Switch Terminal Bolt | 2.0 | 0.20 | 18 in·lb | G |
| Starter Motor Mounting Bolts | 10 | 1.0 | 89 in·lb | |
| Alternator Rotor Bolt | 155 | 15.8 | 114 | |
| Stator Coil Bolts | 12 | 1.2 | 106 in·lb | R |
| Alternator Lead Holding Plate Bolt | 10 | 1.0 | 89 in·lb | R |
| Alternator Cover Bolts | 10 | 1.0 | 89 in·lb | |
| Radiator Bolts (Upper) | 10 | 1.0 | 89 in·lb | |
| Spark Plugs | 13 | 1.3 | 115 in·lb | |
| Fuel Pump Assembly Screws | 0.98 | 0.10 | 8.7 in·lb | R |
| Fuel Pump Bolts | 10 | 1.0 | 89 in·lb | R, S |
| Water Temperature Sensor | 12 | 1.2 | 106 in·lb | |
| Starter Motor Cable Terminal Bolt | 3.0 | 0.31 | 27 in·lb | |
| Engine Ground Terminal Bolt | 10 | 1.0 | 89 in·lb | |
| Side Stand Switch Bolt | 9.0 | 0.92 | 80 in·lb | R |

The tables below, relating tightening torque to thread diameter, lists the basic torque for the bolts, nuts and screws. Use these tables for the bolts, nuts and screws which are not specified the tightening torque particularly on the previous pages. All of the values are for use with dry solvent-cleaned threads.

## Torque and Locking Agent

### Basic Torque for General Fasteners

### For Bolts and Nuts

| Threads Diameter (mm) | Torque | | |
|---|---|---|---|
| | N·m | kgf·m | ft·lb |
| 5 | 4.5 | 0.46 | 40 in·lb |
| 6 | 8.0 | 0.82 | 71 in·lb |
| 8 | 20 | 2.0 | 15 |
| 10 | 35 | 3.6 | 26 |
| 12 | 60 | 6.1 | 44 |

### For Screws, Plastic Part Tightening Portions and Plastic Washer Tightening Portions

| Threads Diameter (mm) | Torque | | |
|---|---|---|---|
| | N·m | kgf·m | ft·lb |
| 4 | 1.2 | 0.12 | 11 in·lb |
| 5 | 3.0 | 0.31 | 27 in·lb |
| 6 | 4.0 | 0.41 | 35 in·lb |

### For Self-Tapping Screws

| Threads Diameter (mm) | Torque | | |
|---|---|---|---|
| | N·m | kgf·m | ft·lb |
| All | 1.2 | 0.12 | 11 in·lb |

### For Wellnuts

| Threads Diameter (mm) | Torque | | |
|---|---|---|---|
| | N·m | kgf·m | ft·lb |
| 4 | 0.2 | 0.02 | 1.8 in·lb |
| 5 | 0.5 | 0.05 | 4.4 in·lb |
| 6 | 1.0 | 0.10 | 8.9 in·lb |

## Specifications

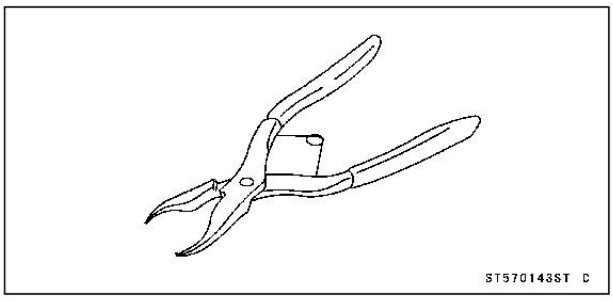
| Item | Standard | Service Limit |
|---|---|---|
| **Fuel System** | | |
| Throttle Grip Free Play | 2 – 3 mm (0.08 – 0.12 in.) | – – – |
| Idle Speed | 1 300 ±50 r/min (rpm) | – – – |
| Throttle Body Vacuum | 31.3 ±1.33 kPa (235 ±10 mmHg) at idle speed | – – – |
| Bypass Screws (Turn Out) | 0 – 2 1/2 (for reference) | – – – |
| Air Cleaner Element | Viscous paper element | – – – |
| **Cooling System** | | |
| Coolant: | | |
| Type (Recommended) | Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) | – – – |
| Color | Green | – – – |
| Mixed Ratio | Soft water 50%, coolant 50% | – – – |
| Freezing Point | –35°C (–31°F) | – – – |
| Total Amount | 2.4 L (2.5 US qt) (Reserve tank full level, including radiator and engine) | – – – |
| **Engine Top End** | | |
| Valve Clearance: | | |
| Exhaust | 0.24 – 0.31 mm (0.0094 – 0.0122 in.) | – – – |
| Intake | 0.13 – 0.19 mm (0.0051 – 0.0075 in.) | – – – |
| **Clutch** | | |
| Clutch Lever Free Play | 2 – 3 mm (0.08 – 0.12 in.) | – – – |
| **Engine Lubrication System** | | |
| Engine Oil: | | |
| Type | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 | – – – |
| Viscosity | SAE 10W-40 | – – – |
| Capacity | 2.8 L (3.0 US qt) (When filter is not removed.) | – – – |
| | 3.1 L (3.3 US qt) (When filter is removed.) | – – – |
| | 3.6 L (3.8 US qt) (When engine is completely dry.) | – – – |
| Oil Level | Between upper and lower level lines (Wait several minutes after idling or running) | – – – |
| **Wheels/Tires** | | |
| Tire Tread Depth: | | |
| Front | 4.1 mm (0.16 in.) | 1 mm (0.04 in.) |
| Rear | 5.8 mm (0.23 in.) | Up to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 kg (80 mph): 3 mm (0.12 in.) |

## Specifications

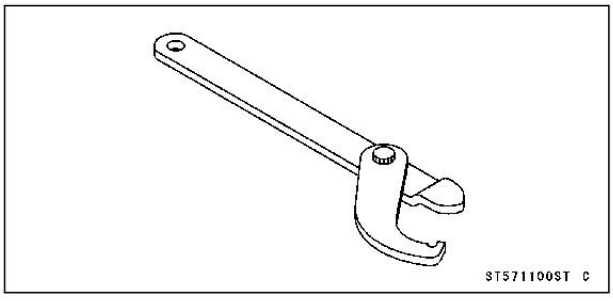
| Item | Standard | Service Limit |
|---|---|---|
| Tire Air Pressure (when cold): | | |
| Front | Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm², 36 psi) | – – – |
| Rear | Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm², 42 psi) | – – – |
| **Final Drive** | | |
| Drive Chain Slack | 30 – 40 mm (1.2 – 1.6 in.) | – – – |
| Drive Chain 20-link Length | 317.5 – 318.2 mm (12.50 – 12.53 in.) | 319 mm (12.6 in.) |
| Standard Chain: | | |
| Make | DAIDO | – – – |
| Type | DID 520HV2 | – – – |
| Link | 112 links | – – – |
| **Brakes** | | |
| Brake Fluid: | | |
| Grade | DOT4 | – – – |
| Brake Pad Lining Thickness: | | |
| Front | 4 mm (0.16 in.) | 1 mm (0.04 in.) |
| Rear | 5 mm (0.20 in.) | 1 mm (0.04 in.) |
| Brake Light Timing: | | |
| Front | Pulled ON | – – – |
| Rear | ON after about 10 mm (0.39 in.) of pedal travel | – – – |
| **Electrical System** | | |
| Spark Plug: | | |
| Type | NGK CR9E | – – – |
| Gap | 0.7 – 0.8 mm (0.028 – 0.031 in.) | – – – |

## Special Tools

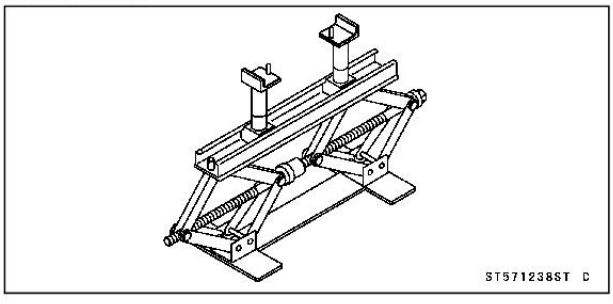
**Inside Circlip Pliers:**
**57001-143**



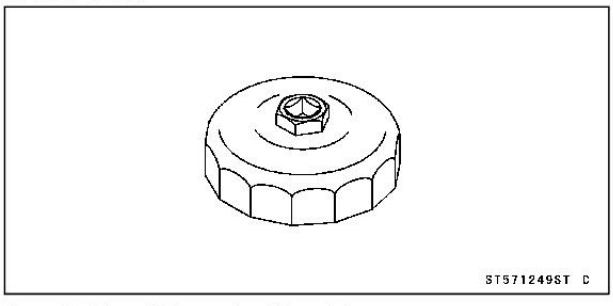

**Steering Stem Nut Wrench:**
**57001-1100**



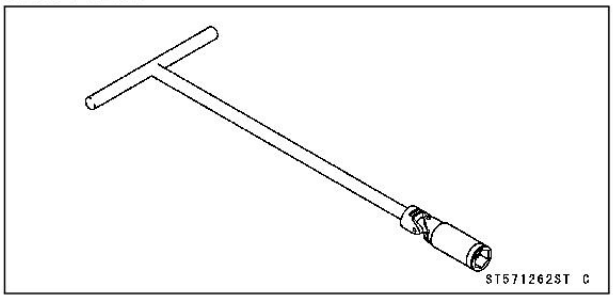

**Jack:**
**57001-1238**



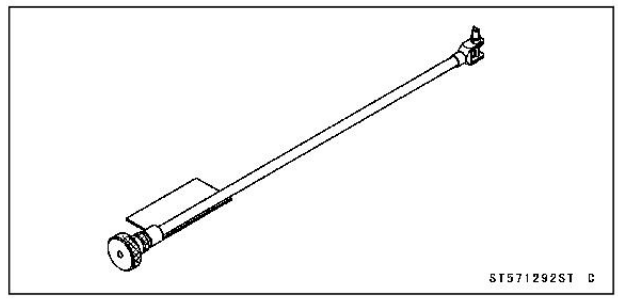

**Oil Filter Wrench:**
**57001-1249**



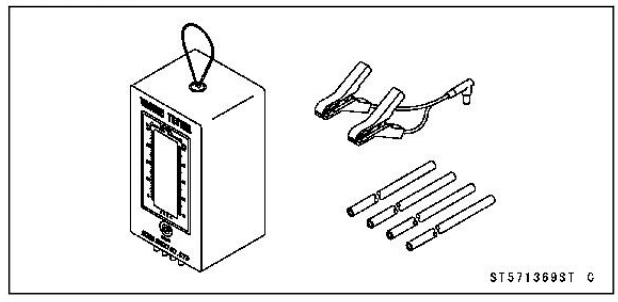

**Spark Plug Wrench, Hex 16:**
**57001-1262**



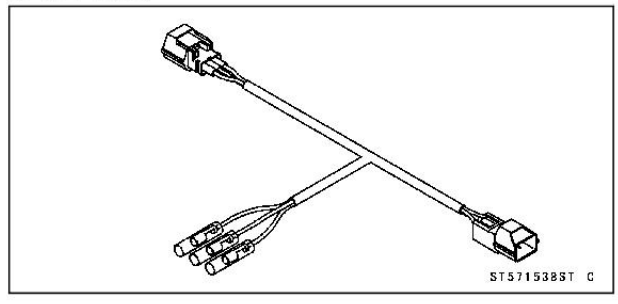

**Pilot Screw Adjuster, C:**
**57001-1292**



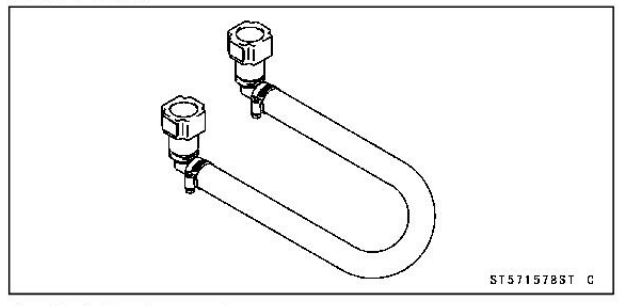

**Vacuum Gauge:**
**57001-1369**



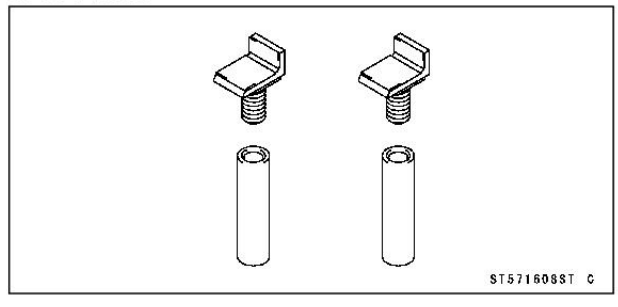

**Throttle Sensor Setting Adapter:**
**57001-1538**




**Extension Tube:**
**57001-1578**

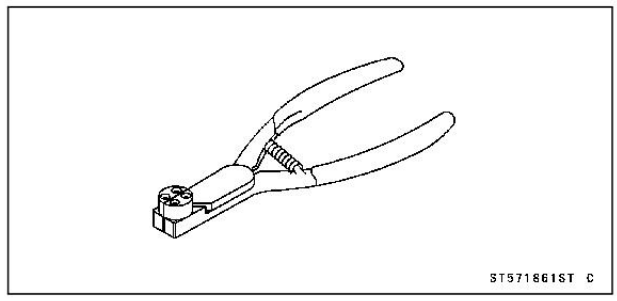



**Jack Attachment:**
**57001-1608**

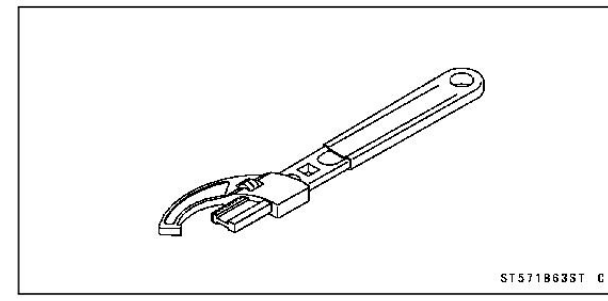


## Special Tools

**Brake Caliper Piston Pliers ($\phi$16 – $\phi$26):**
**57001-1861**




**Adjustable Hook Wrench:**
**57001-1863**



## Periodic Maintenance Procedures

### Fuel System (DFI)

***Air Cleaner Element Replacement***

**NOTE**

○*In dusty areas, the element should be replaced more frequently than the recommended interval.*

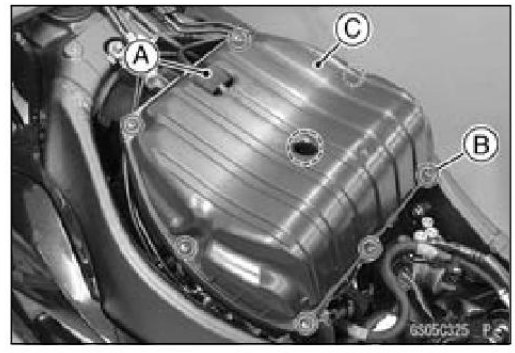
**⚠ WARNING**

**If dirt or dust is allowed to pass through into the throttle body assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.**

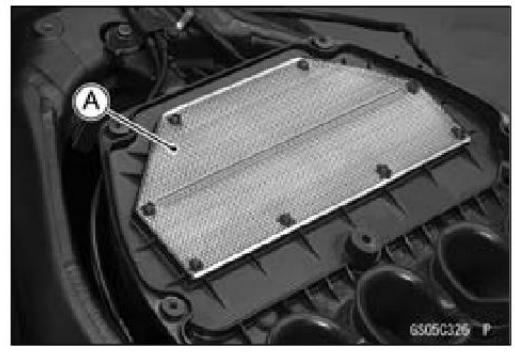
***NOTICE***

**If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.**

- Remove the fuel tank (see Fuel Tank Removal(3-38)).
- Disconnect the intake air temperature sensor connector [A].
- Remove:
  Screws [B]
  Upper Air Cleaner Housing [C]



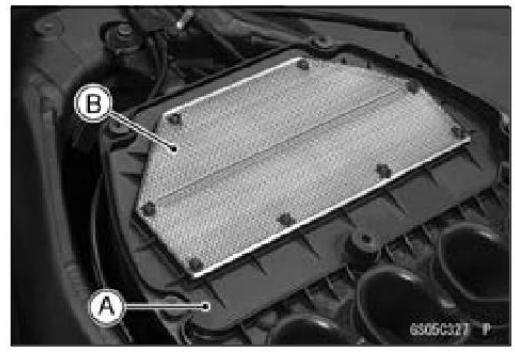

- Discard the air cleaner element [A].




- Install a new element [A] so that the screen side [B] faces upward.

***NOTICE***

**Use only the recommended air cleaner element (Kawasaki part number 11013-0036). Using another air cleaner element will wear the engine prematurely or lower the engine performance.**




- Install the upper air cleaner housing (see Air Cleaner Housing Assembly(3-35)).
- Install the removed parts.

## Periodic Maintenance Procedures

### *Idle Speed Inspection*

- Start the engine and warm it up thoroughly.
- With the engine idling, turn the handlebar to both sides [A].

★If handlebar movement changes the idle speed, the throttle cables may be improperly adjusted or incorrectly routed, or damaged. Be sure to correct any of these conditions before riding (see Throttle Control System Inspection(2-17)) (see Cable, Wire, and Hose Routing section (18-2)).

**⚠ WARNING**

**Operation with improperly adjusted, incorrectly routed or damaged cable could result in an unsafe riding condition. Follow the service manual to make sure to correct any of these conditions.**

- Check the idle speed.

★If the idle speed is out of specified range, adjust it.

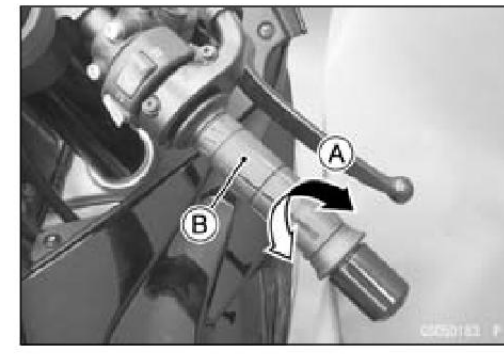
**Idle Speed**
**Standard: 1 300 ±50 r/min (rpm)**

### *Idle Speed Adjustment*

- Start the engine and warm it up thoroughly.
- Turn the adjusting screw [A] until the idle speed is correct.

○Open and close the throttle a few times to make sure that the idle speed is within the specified range. Readjust if necessary.

### *Throttle Control System Inspection*




- Keep the handlebars straight ahead.
- Check the throttle grip free play [A].

★If the free play is incorrect, adjust the throttle cables.

**Throttle Grip Free Play**
**Standard: 2 – 3 mm (0.08 – 0.12 in.)**

- Check that the throttle grip [B] moves smoothly from full open to close, and the throttle closes quickly and completely by the return spring in all steering positions.

★If the throttle grip does not return properly, check the throttle cables routing, grip free play, and cable damage. Then lubricate the throttle cable.

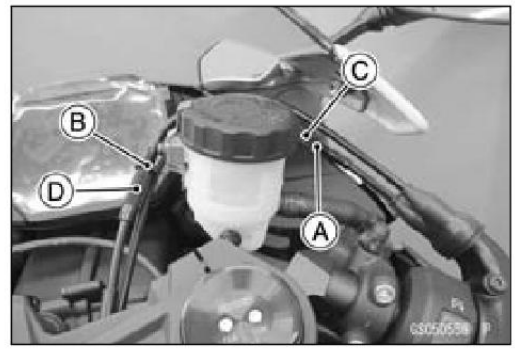
- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.

★If the idle speed increases, check the throttle cable free play and the cable routing.

## Periodic Maintenance Procedures

★If necessary, adjust the throttle cable as follows.
- Loosen the locknuts [A] [B].
- Screw both throttle cable adjusters [C] [D] to give the throttle grip plenty of play.
- Turn the decelerator cable adjuster [C] until it has no play when the throttle grip is completely closed.
- Tighten the locknut [A].
- Turn the accelerator cable adjuster [D] until 2 – 3 mm (0.08 – 0.12 in.) of throttle grip play is obtained.
- Tighten the locknut [B].

★If the free play can not be adjusted with the adjusters, replace the cable.

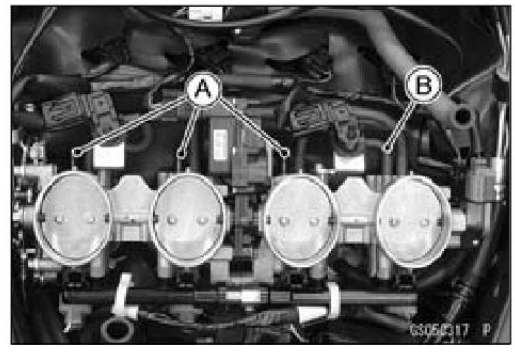



### *Engine Vacuum Synchronization Inspection*

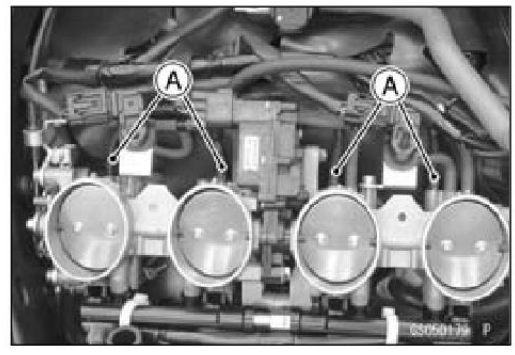
**NOTE**

○*These procedures are explained on the assumption that the intake and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
  Fuel Hose (see Fuel Hose Replacement(2-24))
- For the US and CA models, pull off the rubber caps [A] and vacuum hose [B] from the fittings of each throttle body.




- For other than US and CA models, pull off the vacuum hoses [A].

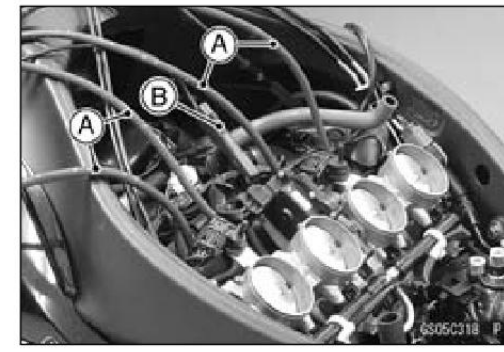


## Periodic Maintenance Procedures

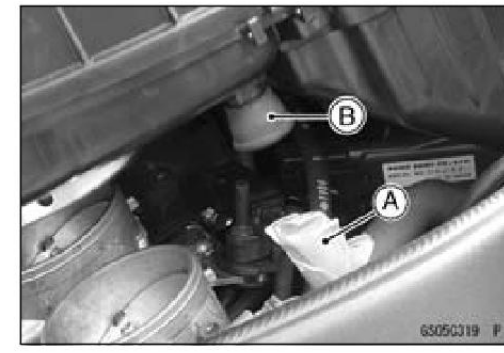
- Connect a vacuum gauge and hoses [A] (Special Tool: 57001-1369) to the fittings on the throttle body.

  **Special Tool - Vacuum Gauge: 57001-1369**

- Connect a highly accurate tachometer lead [B] to one of the stick coil primary leads.

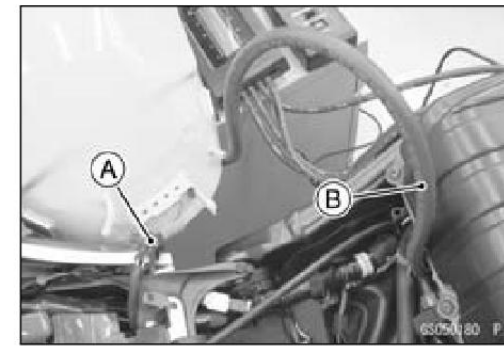



- Plug the air switching valve hose end [A] and air cleaner housing fitting [B].




- Install the air cleaner housing (see Air Cleaner Housing Installation(3-34)).
- Connect the following parts temporarily.
  Fuel Pump Connector [A]
  Extension Tube [B]

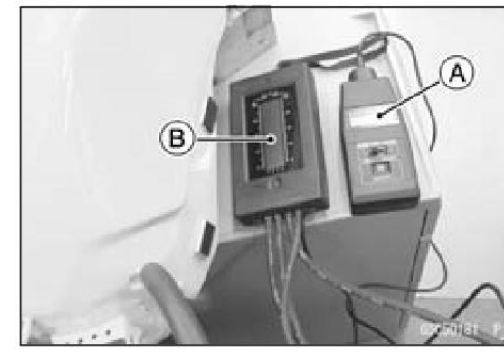
  **Special Tool - Extension Tube: 57001-1578**




- Start the engine and warm it up thoroughly.
- Check the idle speed, using a highly accurate tachometer [A].

  **Idle Speed**
  **Standard: 1 300 ±50 r/min (rpm)**

★If the idle speed is out of the specified range, adjust it with the adjusting screw (see Idle Speed Adjustment(2-17)).




| *NOTICE* |
| --- |
| **Do not measure the idle speed by the tachometer of the meter unit.** |

- While idling the engine, inspect the throttle body vacuum, using the vacuum gauge [B].

  **Throttle Body Vacuum**
  **Standard: 31.3 ±1.33 kPa (235 ±10 mmHg) at idle speed**

## Periodic Maintenance Procedures

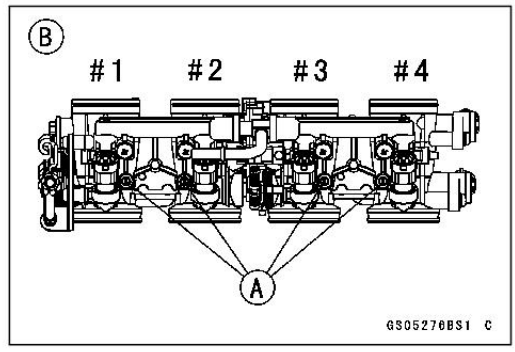
★If any vacuum is not within specifications, adjust the bypass screws [A].
View from Rear [B]

**Special Tool - Pilot Screw Adjuster, C [C]: 57001-1292**

- Adjust the each vacuum (#1 – #4) to the standard value.
- Open and close the throttle valves after each measurement.

**NOTE**

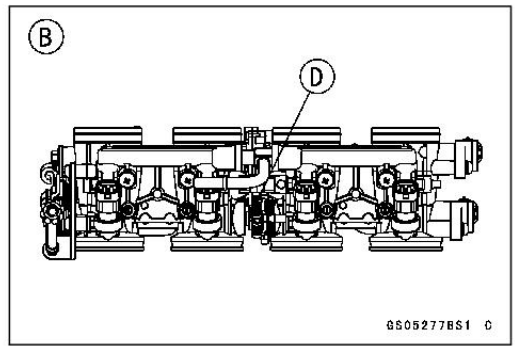
○*Do not turn the center adjusting screw [D].*




- Check the vacuums as before.

★If all vacuums are within the specification range, finish the engine vacuum synchronization.

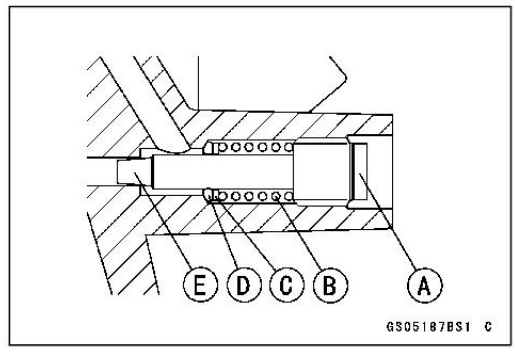
★If any vacuum can not be adjusted within the specification, replace the bypass screws #1 – #4 with new ones, refer to the following procedure.




- Remove the throttle body assy (see Throttle Body Assy Removal(3-28)).
- Turn in the bypass screw [A] with counting the number of turns until it seats fully but not tightly. Record the number of turns.
- Remove:
  Bypass Screw
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw hole in the throttle body for carbon deposits.

★If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.

- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.




| *NOTICE* |
| --- |
| **Do not over-tighten the bypass screw. The tapered portion [E] of the bypass screw could be damaged.** |

## Periodic Maintenance Procedures

● Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

**NOTE**

○*A throttle body has different "turns out" of the bypass screw for each individual unit. On setting the bypass screw, use the "turns out" determined during disassembly.*

● Repeat the same procedure for other bypass screws.
● Repeat the synchronization.
★If the vacuums are correct, check the output voltage of the main throttle sensor.

**Special Tool - Throttle Sensor Setting Adapter: 57001 -1538**

**Main Throttle Sensor Output Voltage**
**Connections to Adapter:**
**Digital Meter (+) → R (sensor Y/W) lead**
**Digital Meter (–) → BK (sensor G) lead**

**Standard: DC 1.02 – 1.05 V at idle throttle opening**

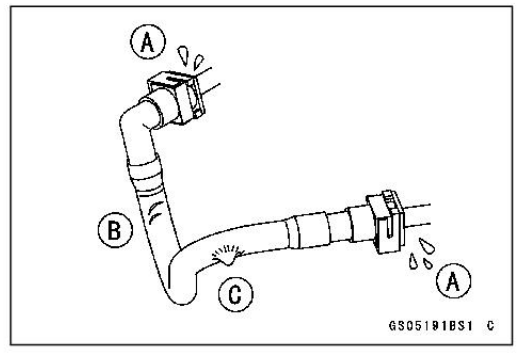
★If the output voltage is out of the standard, check the input voltage of the main throttle sensor (see DTC P0123(17 -60)).

● Remove the vacuum gauge hoses.
● For the US and CA models, install the rubber caps and vacuum hose on the original position.
● For other than US and CA models, install the vacuum hoses.
● Run the vacuum hose correctly (see Cable, Wire, and Hose Routing section (18-2)).
● Install the removed parts.

### *Fuel System*

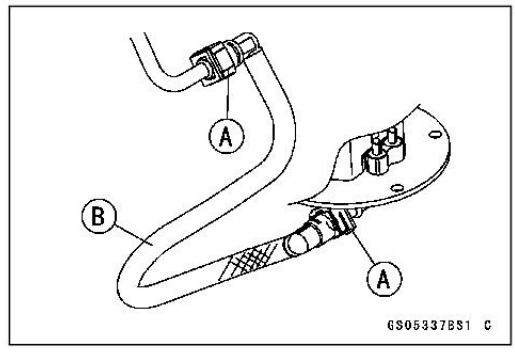
**Fuel Hose Inspection (fuel leak, damage, installation condition)**

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel Tank Removal(3-38)) and check the fuel hoses.
★Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



## Periodic Maintenance Procedures

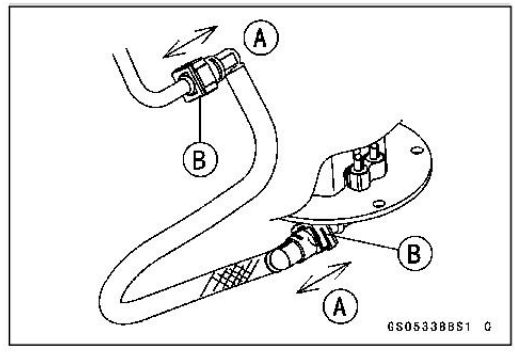
● Check that the fuel hose is routed correctly (see Cable, Wire, and Hose Routing section (18-2)).
★Replace the hose if it has been sharply bent or kinked.
Hose Joints [A]
Fuel Hose [B]




● Check that the fuel hose joints are securely connected.
○Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked.

**⚠ WARNING**

**Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.**




★If it does not locked, reinstall the hose joint.

### *Fuel Filter Replacement*

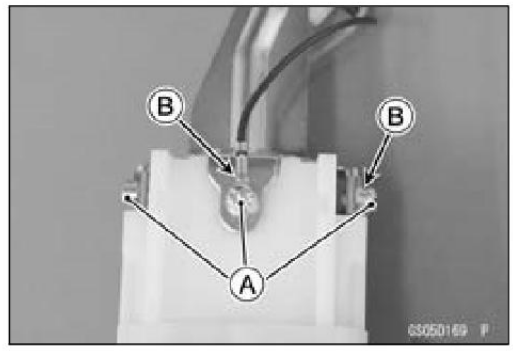
**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.**

***NOTICE***

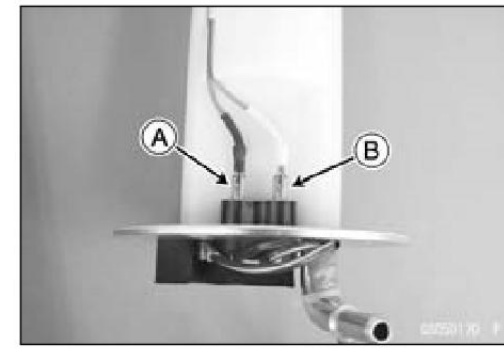
**Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.**

● Remove:
Fuel Pump (see Fuel Pump Removal(3-22))
Fuel Pump Assembly Screws [A]
Lead Terminals [B]

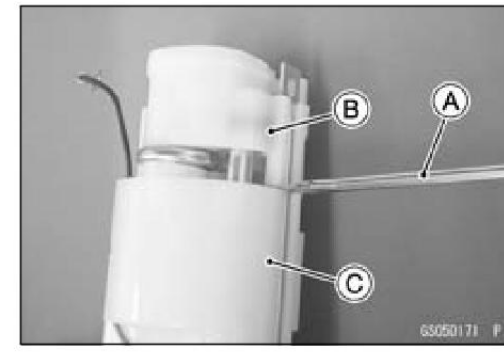


## Periodic Maintenance Procedures

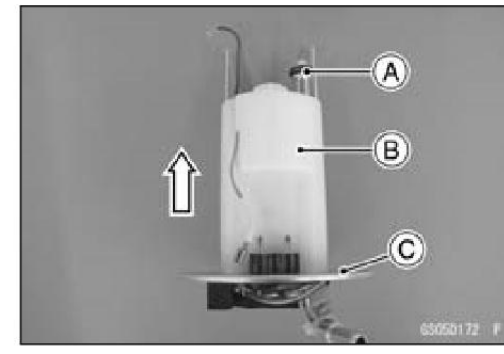
- Disconnect:
  Lead Terminal (Red) [A]
  Lead Terminal (Light Blue) [B]



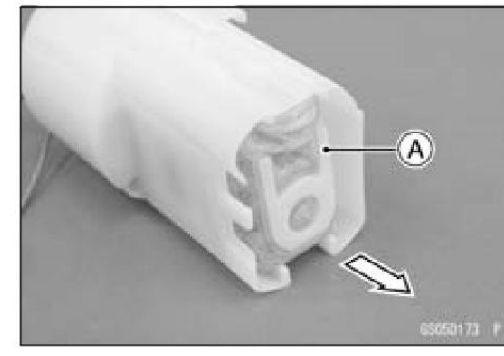

- Using the flat tip screwdriver [A], remove the fuel pump case [B] from the fuel pump body [C].



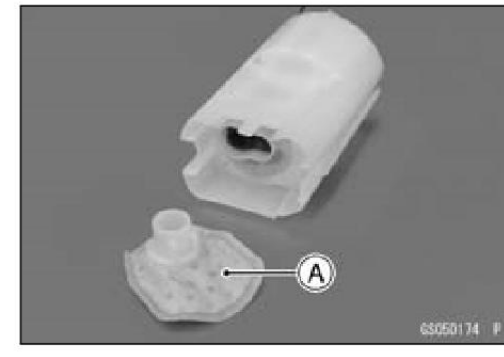

- Remove the O-ring [A].
- Remove the fuel pump body [B] from the installation plate [C].




- Remove the fuel filter [A].

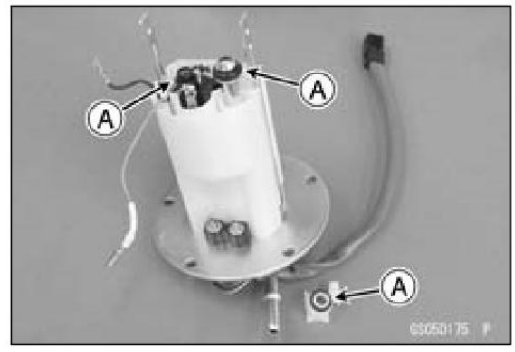


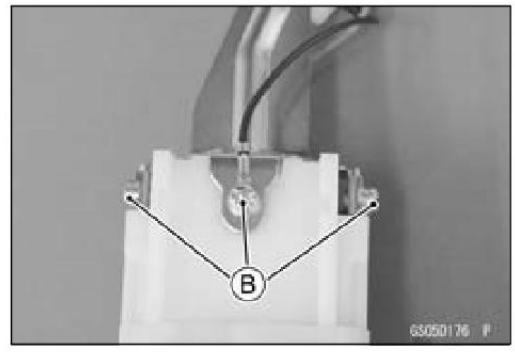

- Replace the fuel filter [A] with a new one, and install it.



## Periodic Maintenance Procedures

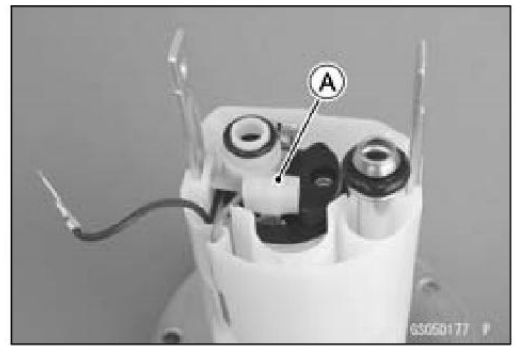
- Replace the following parts with new ones.
  O-rings [A]
  Fuel Pump Assembly Screws [B]



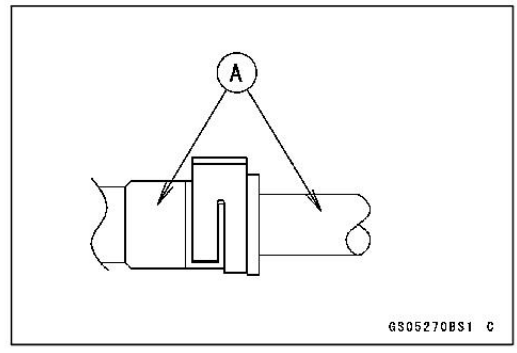

- Install the removed parts in the reverse procedure.
- Install the cap [A] so that the light blue lead terminal is covered as shown.
- Tighten:

**Torque - Fuel Pump Assembly Screws: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)**




### *Fuel Hose Replacement*

- Remove the fuel tank (see Fuel Tank Removal(3-38)).
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.



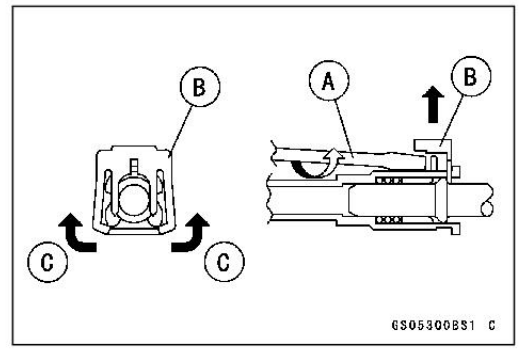
## Periodic Maintenance Procedures

**When removing with flat tip screwdriver**

- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

**When removing with fingers**

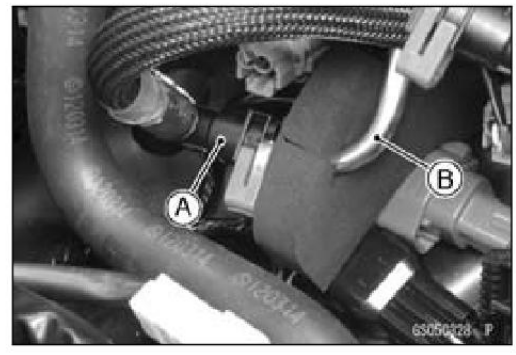
- Open and push up [C] the joint lock with your fingers.




***NOTICE***

**Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.**

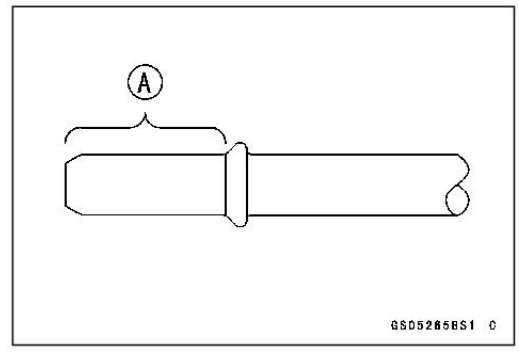
- Pull the fuel hose joint [A] out of the delivery pipe [B].



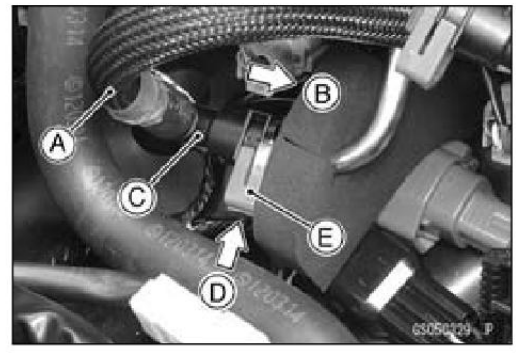

**⚠ WARNING**

**Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.**

- Clean the delivery pipe.
- Cover the delivery pipe with the vinyl bag to keep it clean.
- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].

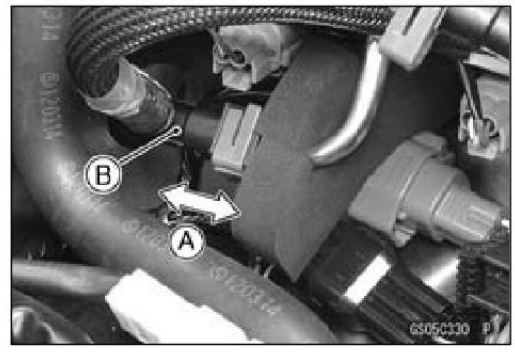



- Replace the fuel hose [A] with a new one.
- Run the fuel hose correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Insert [B] the fuel hose joint [C] straight onto the delivery pipe until the hose joint clicks.
- Push [D] the joint lock [E].



## Periodic Maintenance Procedures

● Push and pull [A] the fuel hose joint [B] back and forth more than two times and make sure it is locked and does not come off.

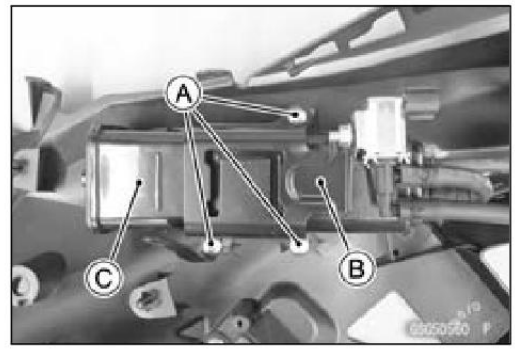



**⚠ WARNING**

**Leaking fuel can cause a fire or explosion resulting in severe burns. Make sure the fuel hose joint is installed correctly on the delivery pipe and that it doesn't leak.**

★If it comes off, reinstall the hose joint.
● Install the fuel tank (see Fuel Tank Installation(3-40)).
● Start the engine and check the fuel hose for leaks.

### *Evaporative Emission Control System Inspection (Other than US and CA Models)*




● Inspect the canister as follows.
● Remove:
Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
Screws [A]
Canister Bracket [B]
Canister [C]
● Visually inspect the canister for cracks or other damage.
★If the canister has any cracks or bad damage, replace it with a new one.

**NOTE**

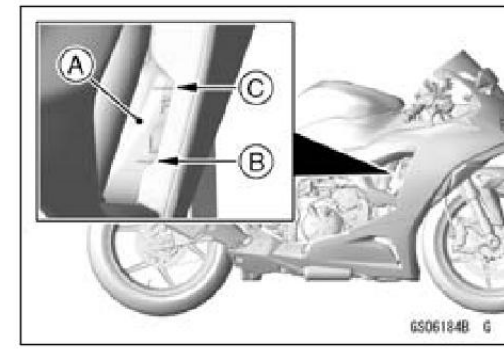
○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

● Inspect the purge valve (see DTC P0443(17-103)) (see DTC P0459(17-104)).
● Replace any kinked, deteriorated or damaged hoses.
● Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.
● Check that the hoses are securely connected and clips are in position.

## Periodic Maintenance Procedures

## Cooling System

### *Coolant Level Inspection*




**NOTE**

○*Check the level when the engine is cold (room or ambient temperature).*

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the side stand).

★If the coolant level is lower than the "L" level line [B], remove the middle inner fairing (see Middle Inner Fairing Removal(15-12)), and then remove the reserve tank cap and add coolant to the "F" level line [C].

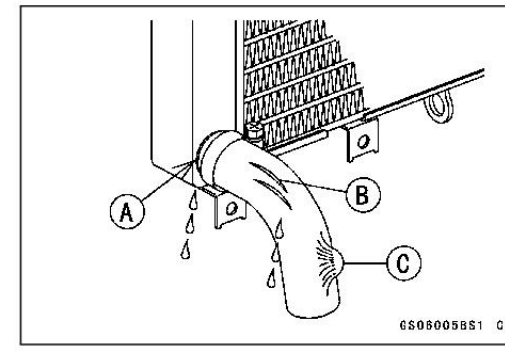
"L": Low
"F": Full

***NOTICE***

**For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.**
**If coolant must be added often or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.**
**Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.**

### *Cooling System*

**Water Hose and Pipe Inspection (coolant leak, damage, installation condition)**




○The high pressure inside the radiator hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.

- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected and clamps are tightened correctly.

### *Coolant Change*

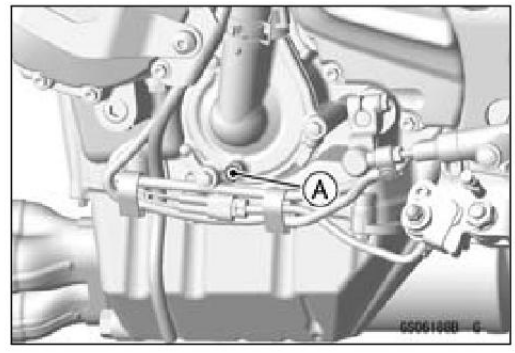
**⚠ WARNING**

**Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.**

## Periodic Maintenance Procedures

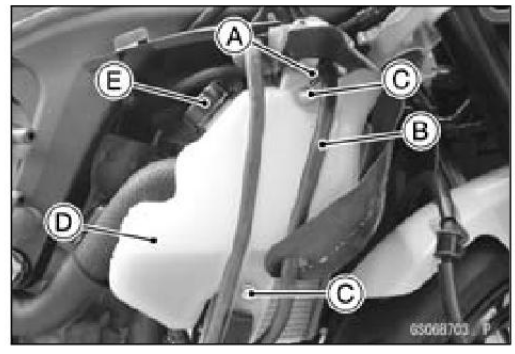
- Remove:
  Lower Fairings (see Lower Fairing Removal(15-9))
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Radiator Cap [A]

- Place a container under the drain bolt [A] of the water pump cover.
- Drain the coolant from the radiator by removing the drain bolt.




- Slide the clamp [A].
- Disconnect:
  Radiator Overflow Hose [B]
- Remove:
  Bolts [C]
  Coolant Reserve Tank [D]
  Cap [E]
- Pour the coolant into a container.
- Install the coolant reserve tank and tighten the bolt.
- Tighten the drain bolt with new gasket.

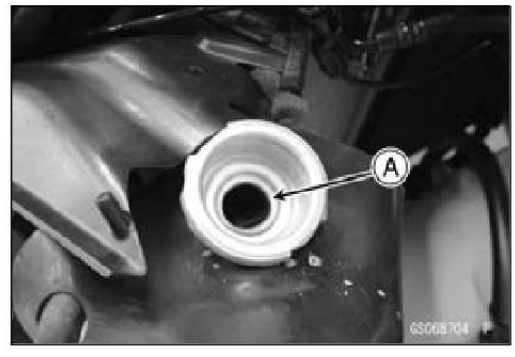
**Torque - Coolant Drain Bolt (Water Pump): 9.0 N·m (0.92 kgf·m, 80 in·lb)**




- Fill the radiator up to the radiator filler neck [A] with coolant, and install the radiator cap.

**NOTE**

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*




***NOTICE***

**Soft or distilled water must be used with the antifreeze (see below for antifreeze) in the cooling system.**
**If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.**

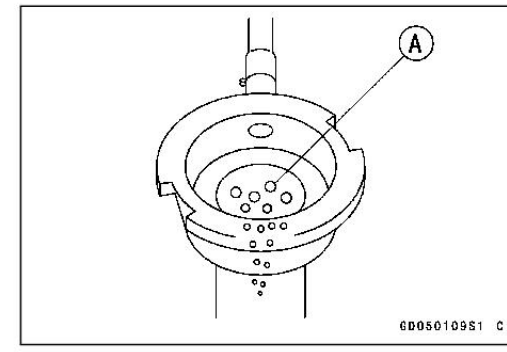
## Periodic Maintenance Procedures

**Water and Coolant Mixture Ratio (Recommended)**

| | |
|---|---|
| **Soft Water:** | **50%** |
| **Coolant:** | **50%** |
| **Freezing Point:** | **–35°C (–31°F)** |
| **Total Amount:** | **2.4 L (2.5 US qt)** |

**NOTE**

○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*




- Check the cooling system for leaks.

○Tap the radiator hoses to force any air bubbles caught inside.

- Fill the coolant to the inlet again.
- Fill the reserve tank up to the "F" level line with coolant, and install the cap.
- Install the radiator cap.
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.

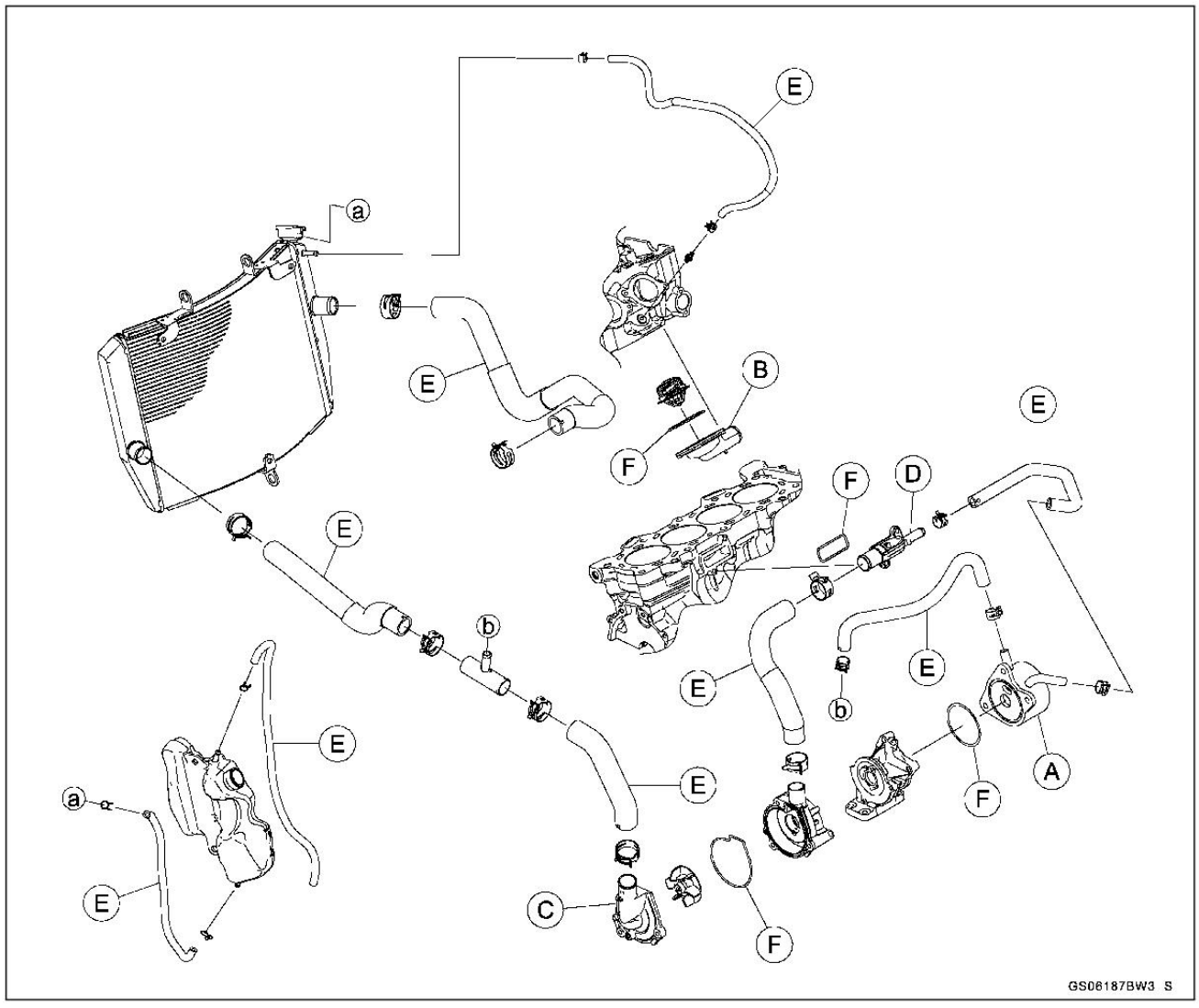
★If the coolant level is lower than the "L" level line, add coolant to the "F" level line.

| ***NOTICE*** |
|---|
| **Do not add more coolant above the "F" level line.** |

## Periodic Maintenance Procedures

### *Water Hose and O-ring Replacement*

- Drain the coolant (see Coolant Change(2-27)).
- Remove:
  Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Oil Cooler [A] (see Oil Cooler Removal(7-18))
  Thermostat Housing Cover [B] (see Thermostat Removal(4-16))
  Water Pump Cover [C] (see Water Pump Removal(4-10))
  Fitting [D]
- Replace the hoses [E] and O-rings [F] with new ones.
- Apply grease to the new O-rings.
- Run the new hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.
- Fill the coolant (see Coolant Change(2-27)).
- Check the cooling system for leaks.



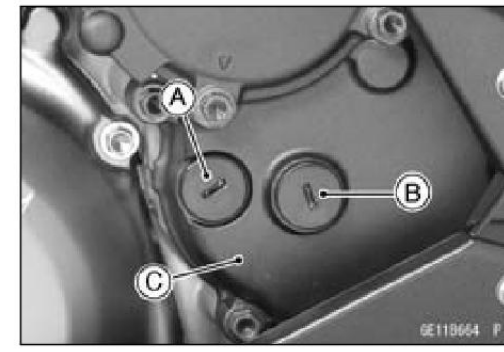
## Periodic Maintenance Procedures

### Engine Top End

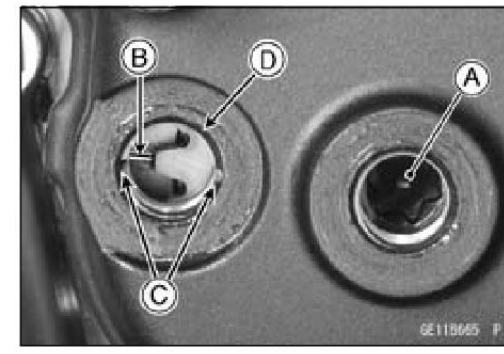
***Valve Clearance Inspection***

**NOTE**

○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*




- Remove the cylinder head cover (see Cylinder Head Cover Removal(5-14)).
- Remove the timing inspection cap [A] and starter clutch bolt cap [B] on the starter clutch cover [C].



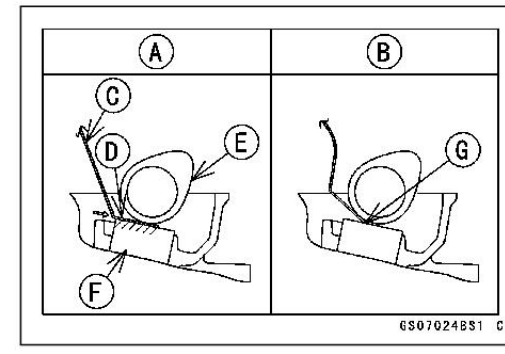

- Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.

- Using a thickness gauge [A], measure the valve clearance between the cam and the valve lifter.

**Valve Clearance**
**Standard:**
**Exhaust 0.24 – 0.31 mm (0.0094 – 0.0122 in.)**
**Intake 0.13 – 0.19 mm (0.0051 – 0.0075 in.)**

**NOTE**

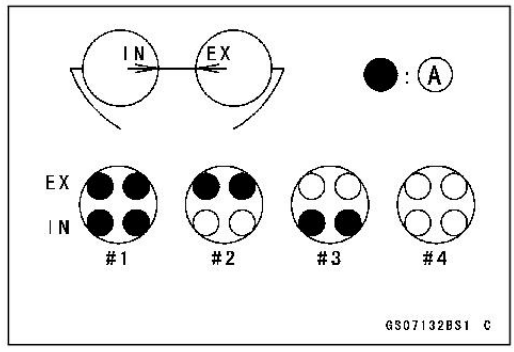
○*Thickness gauge is horizontally inserted on the valve lifter.*



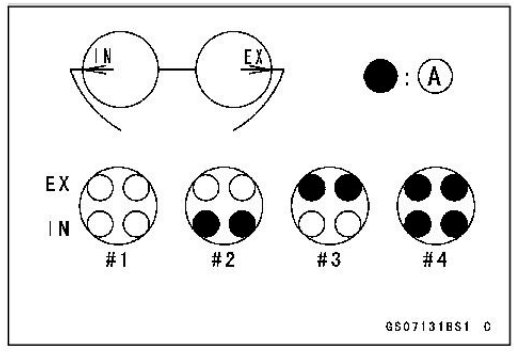

Appropriateness [A]
Inadequacy [B]
Thickness Gauge [C]
Horizontally Inserts [D]
Cam [E]
Valve Lifter [F]
Hits the Valve Lifter Ahead [G]

## Periodic Maintenance Procedures

○**When positioning #1 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #1 and #3 Cylinders
Exhaust Valve Clearance of #1 and #2 Cylinders
Measuring Valve [A]




○**When positioning #4 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #2 and #4 Cylinders
Exhaust Valve Clearance of #3 and #4 Cylinders
Measuring Valve [A]



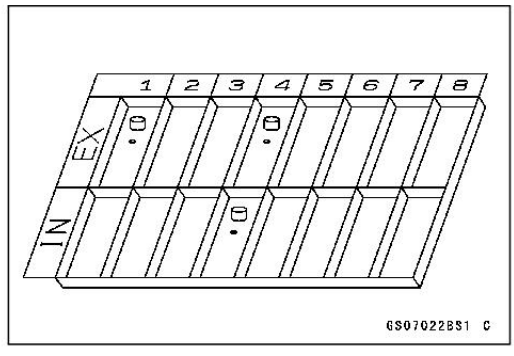

★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

### *Valve Clearance Adjustment*

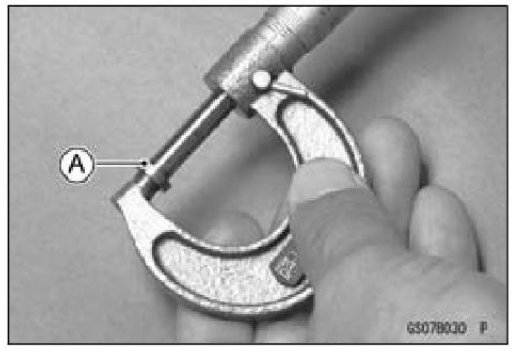
- To change the valve clearance, remove the camshafts (see Camshaft Removal(5-18)) and valve lifters.
- Replace the shim with one of a different thickness.

**NOTE**

○*Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*




- Clean the shim to remove any dust or oil.
- Measure the thickness of the removed shim [A].
- Select a new shim thickness calculation as follows.




a + b – c = d

[a] Present Shim Thickness

[b] Measured Valve Clearance

[c] Specified Valve Clearance [Mean Value = 0.275 mm (Exhaust), 0.160 mm (Intake)]

[d] Replace Shim Thickness

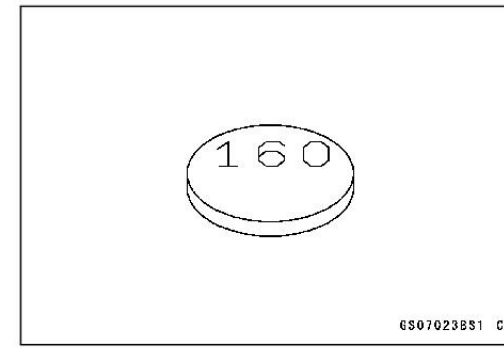
**Example (Exhaust):**
1.600 + 0.33 – 0.275 = 1.655 mm

○Exchange the shim for the 1.675 size shim.

## Periodic Maintenance Procedures

**Adjustment Shims**

| Thickness | Part Number | Mark |
|---|---|---|
| 1.300 | 92180-0108 | 130 |
| 1.325 | 92180-0109 | 132 |
| 1.350 | 92180-0110 | 135 |
| 1.375 | 92180-0111 | 138 |
| 1.400 | 92180-0112 | 140 |
| 1.425 | 92180-0113 | 142 |
| 1.450 | 92180-0114 | 145 |
| 1.475 | 92180-0115 | 148 |
| 1.500 | 92180-0116 | 150 |
| 1.525 | 92180-0117 | 152 |
| 1.550 | 92180-0118 | 155 |
| 1.575 | 92180-0119 | 158 |
| 1.600 | 92180-0120 | 160 |
| 1.625 | 92180-0121 | 162 |
| 1.650 | 92180-0122 | 165 |
| 1.675 | 92180-0123 | 168 |
| 1.700 | 92180-0124 | 170 |
| 1.725 | 92180-0125 | 172 |
| 1.750 | 92180-0126 | 175 |
| 1.775 | 92180-0127 | 178 |
| 1.800 | 92180-0128 | 180 |
| 1.825 | 92180-0129 | 182 |
| 1.850 | 92180-0130 | 185 |
| 1.875 | 92180-0131 | 188 |
| 1.900 | 92180-0132 | 190 |
| 1.925 | 92180-0133 | 192 |
| 1.950 | 92180-0134 | 195 |
| 1.975 | 92180-0135 | 198 |
| 2.000 | 92180-0136 | 200 |
| 2.025 | 92180-0137 | 202 |
| 2.050 | 92180-0138 | 205 |
| 2.075 | 92180-0139 | 208 |
| 2.100 | 92180-0140 | 210 |
| 2.125 | 92180-0141 | 212 |
| 2.150 | 92180-0142 | 215 |
| 2.175 | 92180-0143 | 218 |
| 2.200 | 92180-0144 | 220 |
| 2.225 | 92180-0145 | 222 |
| 2.250 | 92180-0146 | 225 |
| 2.275 | 92180-0147 | 228 |
| 2.300 | 92180-0148 | 230 |



## Periodic Maintenance Procedures

**NOTICE**

**Be sure to remeasure the clearance after selecting a shim. The clearance can be out of the specified range because of the shim tolerance.**

○If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim or the valve lifter to keep the shim in place during camshaft installation.

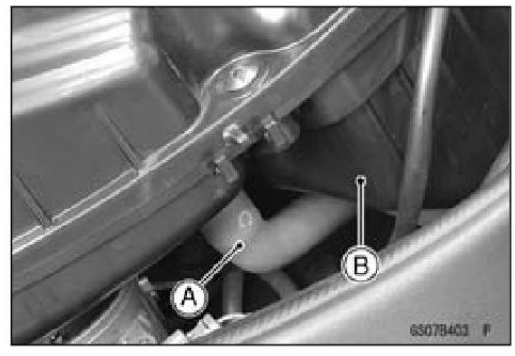
**NOTICE**

**Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.**
**Do not grind the shim. This may cause it to fracture, causing extensive engine damage.**

- Apply molybdenum disulfide oil solution to the valve lifter surface and install the lifter.
- Install the camshafts (see Camshaft Installation(5-19)).
- Recheck the valve clearance and readjust if necessary.
- Install the removed parts.

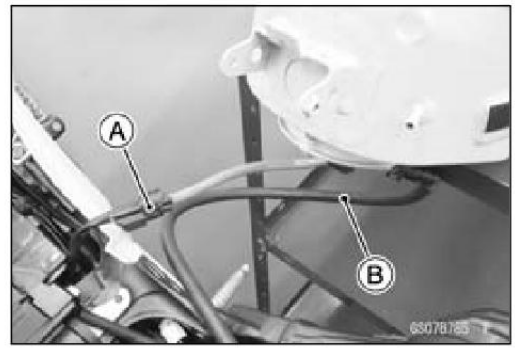
### *Air Suction System Damage Inspection*

- Remove the Fuel Tank (see Fuel Tank Removal(3-38)).
- Disconnect the air switching valve hose [A] from the lower air cleaner housing [B] (see Air Cleaner Housing Removal(3-33)).




- Connect the following parts temporarily.
  Fuel Pump Connector [A]
  Extension Tube [B]
  Air Cleaner Housing (see Air Cleaner Housing Installation(3-34))

**Special Tool - Extension Tube: 57001-1578**



## Periodic Maintenance Procedures

- Start the engine and run it at idle speed.
- Plug the air switching valve hose end [A] with your finger and feel vacuum pulsing in the hose.

★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test(16-58)) or air suction valve (see Air Suction Valve Inspection(5-12)).

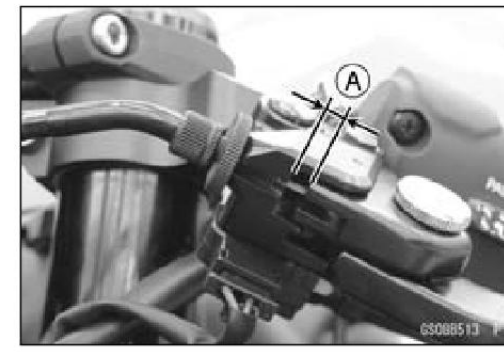
## Clutch

### *Clutch Operation Inspection*

- Keep the handlebars straight ahead.
- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

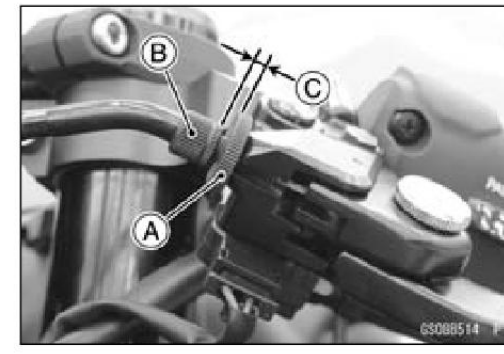
**Clutch Lever Free Play**
**Standard: 2 – 3 mm (0.08 – 0.12 in.)**



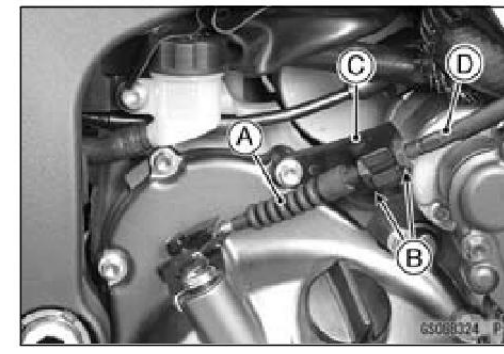

**⚠ WARNING**

**The engine and exhaust system get extremely hot during normal operation and can cause serious burns. Never touch the engine or exhaust pipe during clutch adjustment.**

- Loosen the locknut [A].
- Turn the adjuster [B] so that 5 – 6 mm (0.20 – 0.24 in.) [C] of threads is visible.




- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the bracket [C] on the clutch cover as far as they will go.
- Pull the clutch outer cable [D] tight and tighten the adjusting nuts against the bracket.
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.

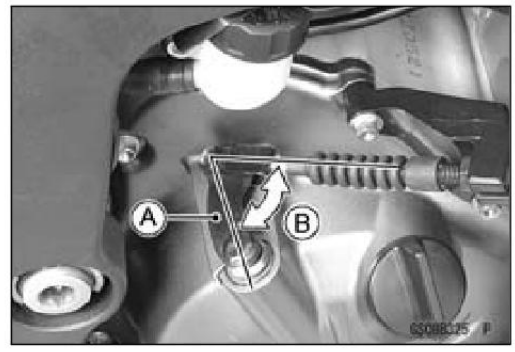


## Periodic Maintenance Procedures

- Push the release lever [A] toward the front of the motorcycle until it becomes hard to turn.

○At this time, the release lever should have the proper angle shown.
60° [B]

★If the angle is wrong, check the clutch and release parts for wear.




**⚠ WARNING**

**Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.**

- After the adjustment, start the engine and check that the clutch does not slip and that it releases properly.

## Engine Lubrication System

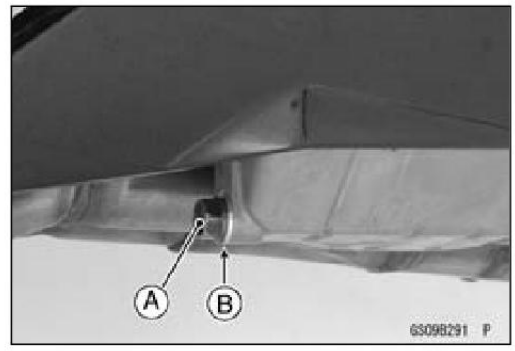
### *Engine Oil Change*

- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement(2-37)).

- Replace the drain bolt gasket [B] with a new one.
- Tighten the drain bolt.

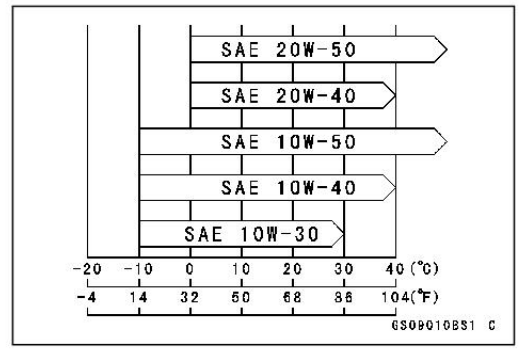
**Torque - Engine Oil Drain Bolt: 29 N·m (3.0 kgf·m, 21 ft·lb)**




- Remove the oil filler plug [A].

## Periodic Maintenance Procedures

● Pour in the specified type and amount of oil.




**Recommended Engine Oil**

**Type:** **API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**

**Viscosity:** **SAE 10W-40**

**Capacity:** **2.8 L (3.0 US qt) (when filter is not removed.)**

**3.1 L (3.3 US qt) (when filter is removed.)**

**3.6 L (3.8 US qt) (when engine is completely dry.)**

**NOTE**

○*Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.*

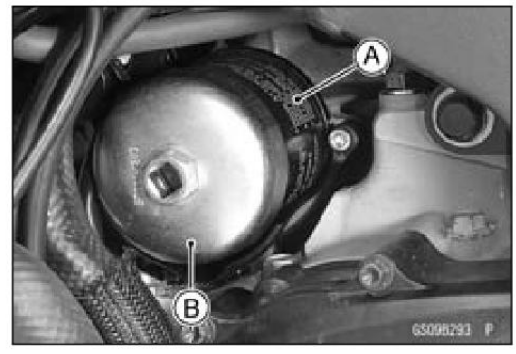
○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*

● Replace the O-ring of the oil filler plug with a new one.
● Apply grease to the new O-ring.
● Install the oil filler plug.
● Check the oil level (see Oil Level Inspection(7-9)).

### *Oil Filter Replacement*

● Drain the engine oil (see Engine Oil Change(2-36)).
● Remove the oil filter [A] with the oil filter wrench [B].

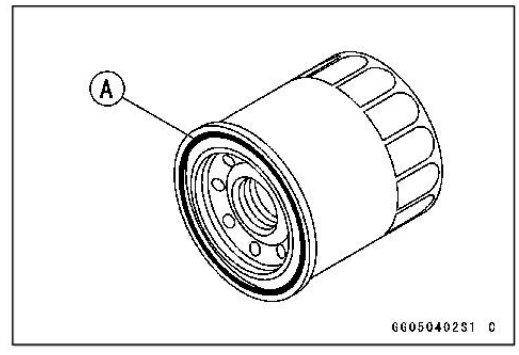
**Special Tool - Oil Filter Wrench: 57001-1249**




● Replace the filter with a new one.
● Apply grease to the gasket [A] before installation.
● Tighten the filter with the oil filter wrench.

**Special Tool - Oil Filter Wrench: 57001-1249**

**Torque - Oil Filter: 17 N·m (1.7 kgf·m, 13 ft·lb)**




**NOTE**

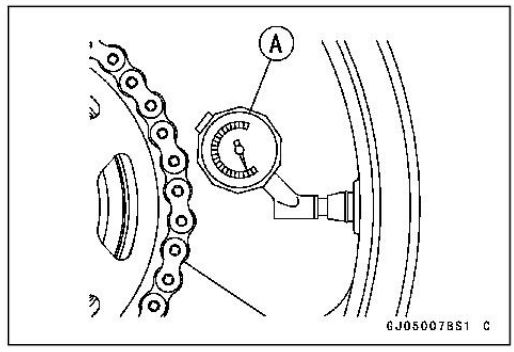
○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

● Pour in the specified type and amount of oil (see Engine Oil Change(2-36)).

## Periodic Maintenance Procedures

### Wheels/Tires

#### *Air Pressure Inspection*



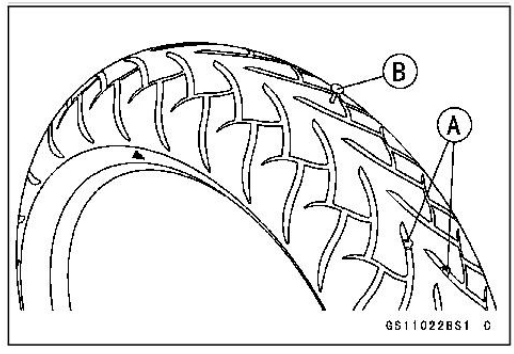

- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.
- ★Adjust the tire air pressure according to the specifications if necessary.

**Air Pressure (when Cold)**

**Front: Up to 180 kg (397 lb) load:**
**250 kPa (2.50 kgf/cm², 36 psi)**

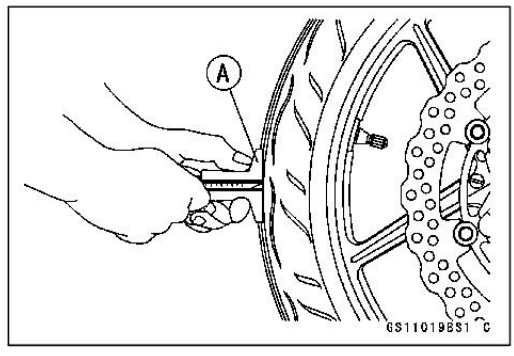
**Rear: Up to 180 kg (397 lb) load:**
**290 kPa (2.90 kgf/cm², 42 psi)**

#### *Wheels and Tires*




**Wheel/Tire Damage Inspection**

- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.
- ★If any damage is found, replace the wheel if necessary.




**Tire Tread Wear Inspection**

As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.
- ★If any measurement is less than the service limit, replace the tire (see Tire Removal(10-13)) (see Tire Installation(10-13)).

**Tread Depth**

| | |
|---|---|
| **Standard:** | |
| **Front** | **4.1 mm (0.16 in.)** |
| **Rear** | **5.8 mm (0.23 in.)** |
| **Service Limit:** | |
| **Front** | **1 mm (0.04 in.)** |
| **Rear** | **2 mm (0.08 in.) (Up to 130 km/h (80 mph))** |
| | **3 mm (0.12 in.) (Over 130 km/h (80 mph))** |

## Periodic Maintenance Procedures

**⚠ WARNING**

**Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.**

**NOTE**

○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*

○*Check and balance the wheel when a tire is replaced with a new one.*

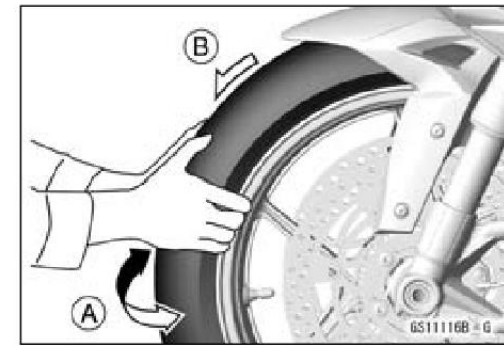
### *Wheel Bearing Damage Inspection*

- Raise the front wheel off the ground.

**Special Tools - Jack: 57001-1238**
**Jack Attachment: 57001-1608**

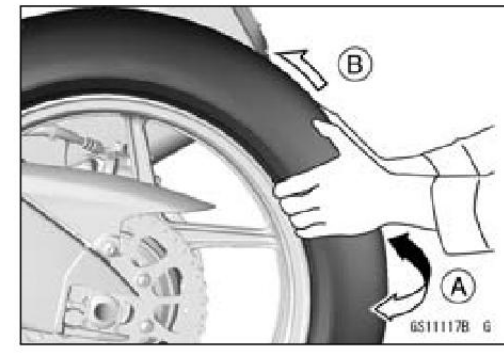
- Turn the handlebars all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the front wheel and inspect the wheel bearing (see Front Wheel Removal(10-6)) (see Hub Bearing Inspection(10-17)).




- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal(10-7)).
- Inspect the roughness of the rear wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the rear wheel and inspect the wheel bearing (see Rear Wheel Removal(10-7)) (see Hub Bearing Inspection(10-17)) and coupling (see Coupling Bearing Installation(11-14)).




## Final Drive

### *Drive Chain Lubrication Condition Inspection*

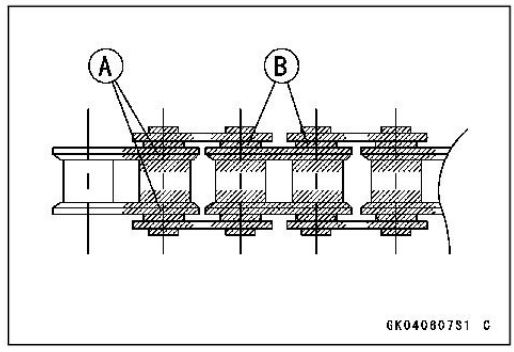
- If a special lubricant is not available, a heavy oil such as SAE 90 is preferred to a lighter oil because it will stay on the chain longer and provide better lubrication.
- If the chain appears especially dirty, clean it before lubrication.

***NOTICE***

**The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.**
**Use only kerosene or diesel oil for cleaning of the O-ring of the drive chain. Any other cleaning solution such as gasoline will cause deterioration and swelling of the O-ring. Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.**

## Periodic Maintenance Procedures

- Apply oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.
  Oil Applied Areas [A]
  O-rings [B]




### *Drive Chain Slack Inspection*

**NOTE**

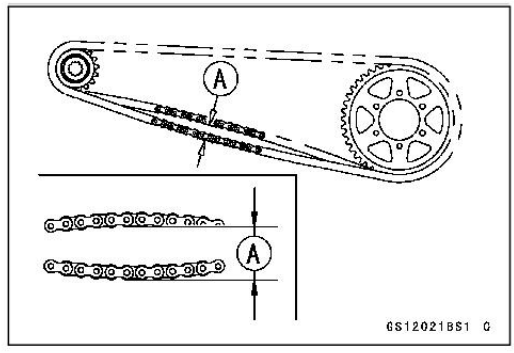
○*Check the slack with the motorcycle setting on its sidestand.*

○*Clean the chain if it is dirty, and lubricate it if it appears dry.*

- Check the wheel alignment (see Wheel Alignment Inspection(2-41)).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

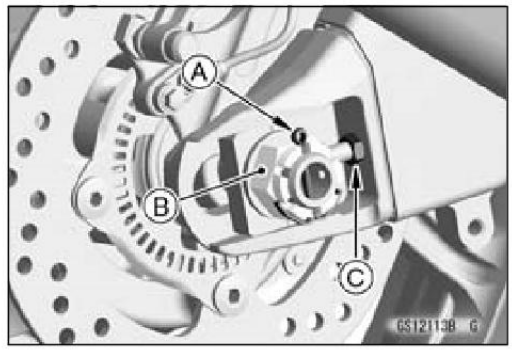
★If the chain slack exceeds the standard, adjust it.

**Chain Slack**
**Standard: 30 – 40 mm (1.2 – 1.6 in.)**




### *Drive Chain Slack Adjustment*

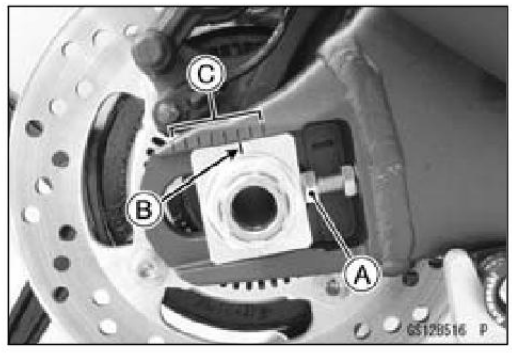
- Remove the cotter pin [A], and loosen the rear axle nut [B].
- Loosen the both chain adjuster locknuts [C].




★If the chain is too loose, turn out the left and right chain adjusters [A] evenly.

★If the chain is too tight, turn in the left and right chain adjusters evenly, and push the wheel forward.

- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the notch [B] on the right wheel alignment indicator should align with the same swingarm mark or position [C] that the left indicator notch aligns with.



## Periodic Maintenance Procedures

**⚠ WARNING**

**Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.**

- Tighten the both chain adjuster locknuts securely.
- Tighten:

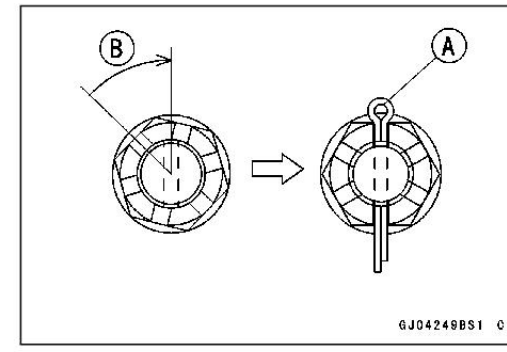
**Torque - Rear Axle Nut: 130 N·m (13.3 kgf·m, 95.9 ft·lb)**

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

- Insert a new cotter pin [A].

**NOTE**

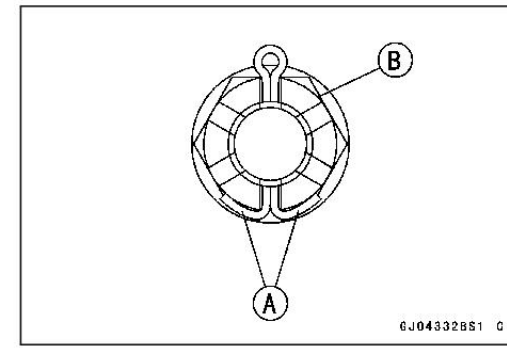
*○When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
*○It should be within 30 degrees.*
*○Loosen once and tighten again when the slot goes past the nearest hole.*




- Bend the cotter pin [A] over the nut [B].

**⚠ WARNING**

**A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.**



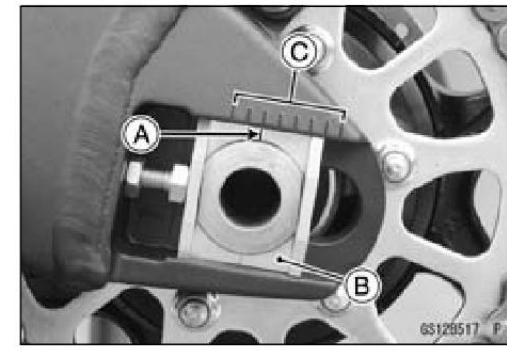

### *Wheel Alignment Inspection*

- Check that the notch [A] on the left alignment indicator [B] aligns with the same swingarm mark or position [C] that the right alignment indicator notch aligns with.

★If they do not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment(2-40)).

**NOTE**

*○Wheel alignment can be also checked using the straightedge or string method.*

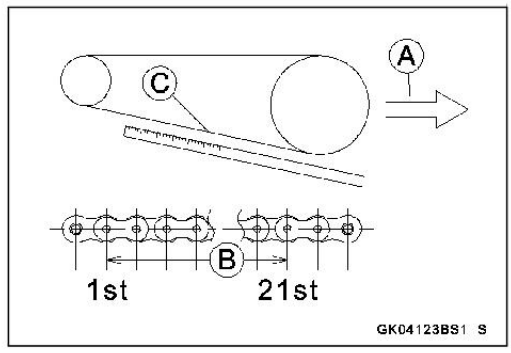



**⚠ WARNING**

**Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.**

## Periodic Maintenance Procedures

### *Drive Chain Wear Inspection*




- Remove the chain cover (see Drive Chain Replacement(11-6)).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

★If there is any irregularity, replace the drive chain.

★Lubricate the drive chain if it appears dry.

- The drive chain may wear unevenly, so check the chain slack by changing the position, and position the loosest part of the drive chain lower side.
- Loosen the rear axle shaft, and pull [A] the rear wheel rearward to stretch the drive chain steady. Measure the length of 20 links [B] on the straight part [C] of the lower side of chain from the pin center of the 1st pin to the pin center of the 21st pin.

★If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.

**Drive Chain 20-link Length**

**Standard: 317.5 – 318.2 mm (12.50 – 12.53 in.)**

**Service Limit: 319 mm (12.6 in.)**

**⚠ WARNING**

**A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain. It is an endless type and should not be cut for installation.**

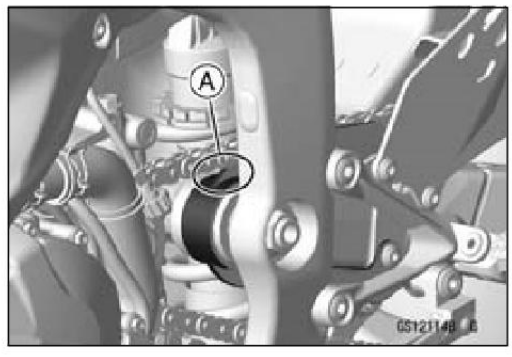
**Standard Chain**

**Make: DAIDO**

**Type: DID 520HV2**

**Link: 112 links**

### *Chain Guide Wear Inspection*




- Remove the engine sprocket cover (see Engine Sprocket Cover Removal(11-11)).
- Visually inspect the chain guide [A].

★Replace the chain guide if it shows any signs of abnormal wear or damage.

## Periodic Maintenance Procedures

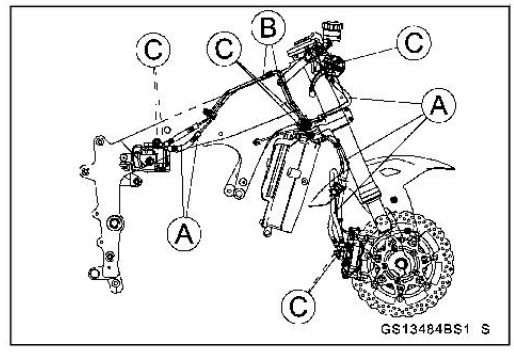
# Brakes

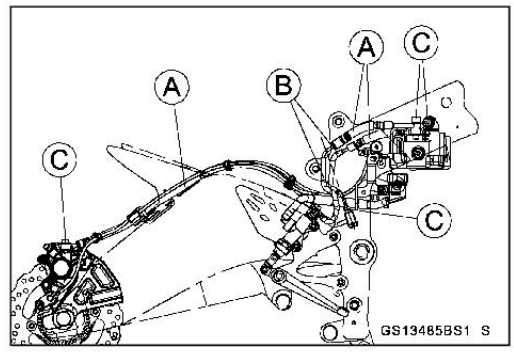
### *Brake System Inspection*

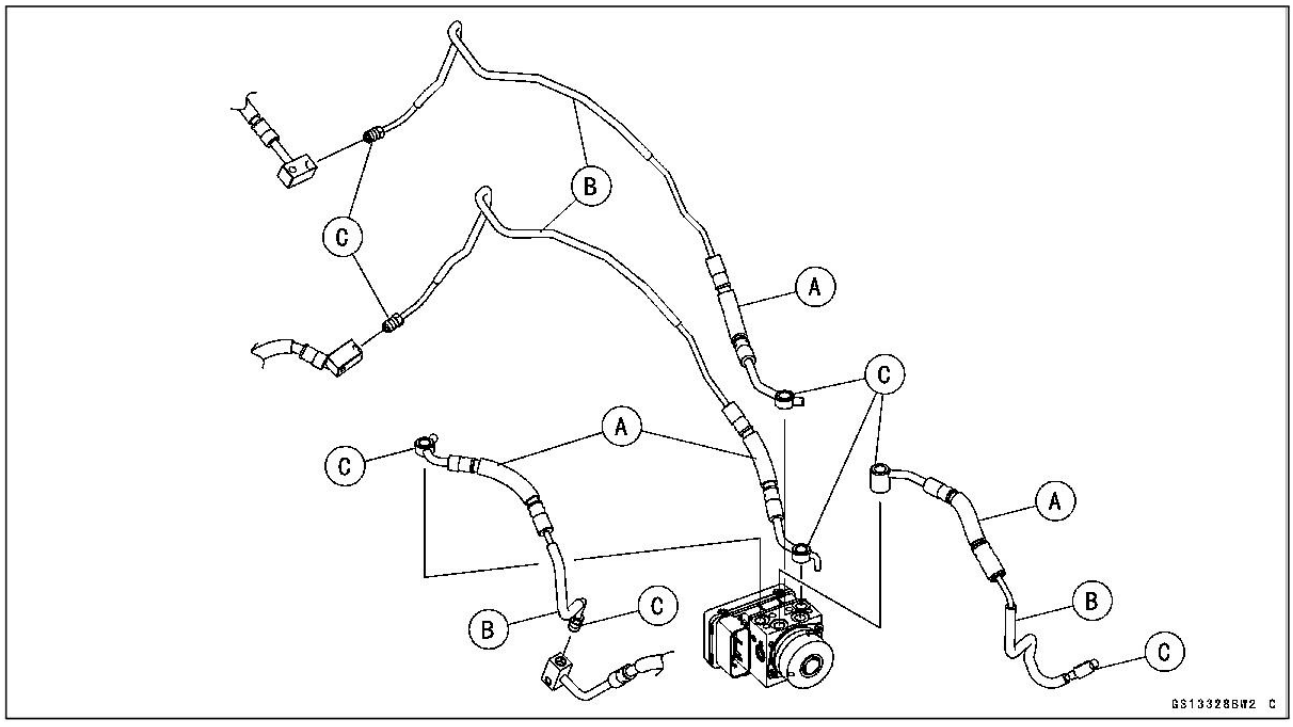
**Brake Fluid Leak (Brake Hose and Pipe) Inspection**

- For ABS equipped models, remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipes [B] (ABS equipped models) and fittings [C].

★If the brake fluid leaked from any position, inspect or replace the problem parts.



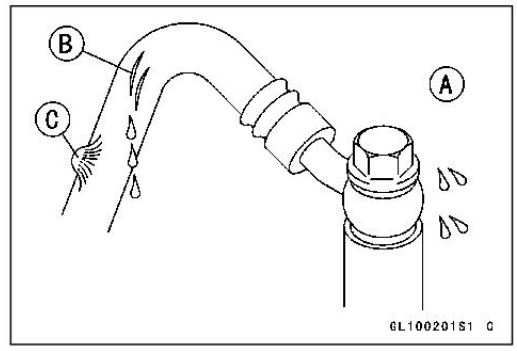




**Brake Hose and Pipe Damage and Installation Condition Inspection**

- For ABS equipped models, remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Inspect the brake hoses, pipe and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose, pipes (ABS equipped models) to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

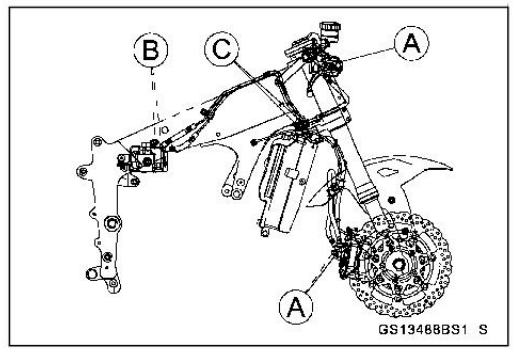
★Replace the hose and pipe (ABS equipped models) if any crack [B], bulge [C] or leakage is noticed (see Brake Hose and Pipe Replacement(2-47)).



## Periodic Maintenance Procedures

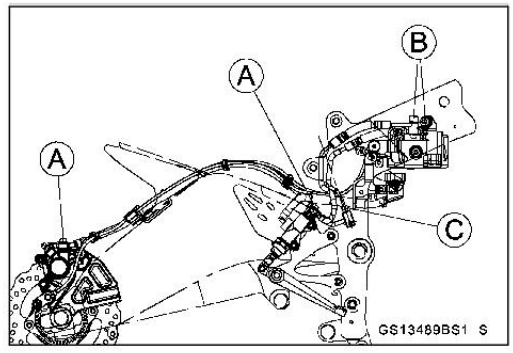
★Tighten any brake hose banjo bolts and brake pipe banjo bolts to check tightness condition.

**Torque - Brake Hose Banjo Bolts [A]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Brake Pipe Banjo Bolts [B] (ABS Equipped Models): 23 N·m (2.3 kgf·m, 17 ft·lb)**
**Brake Pipe Joint Nuts [C] (ABS Equipped Models): 14.5 N·m (1.48 kgf·m, 10.7 ft·lb)**




- Inspect the brake hose and pipe routing.

★If any brake hose and pipe routing is incorrect, run the brake hose and pipe correctly (see Cable, Wire, and Hose Routing section (18-2)).




### *Brake Operation Inspection*

- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

**⚠ WARNING**

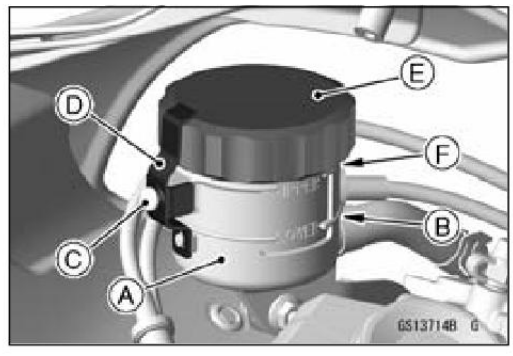
**When test riding the vehicle, be aware of surrounding traffic for your safety.**

### *Brake Fluid Level Inspection*

- Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

**NOTE**

○*Hold the reservoir horizontal by turning the handlebar when checking brake fluid level.*



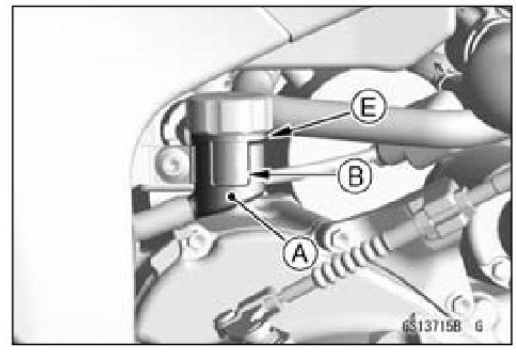

***NOTICE***

**Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.**

★If the fluid level is lower than the lower level line, remove the screw [C], stopper [D] and cap [E] then fill the reservoir to the upper level line [F].

## Periodic Maintenance Procedures

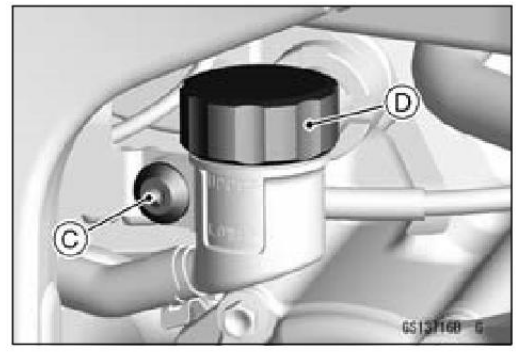
● Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].




**NOTICE**

**Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.**

★If the fluid level is lower than the lower level line, remove the bolt [C] and cap [D] then fill the reservoir to the upper level line [E].



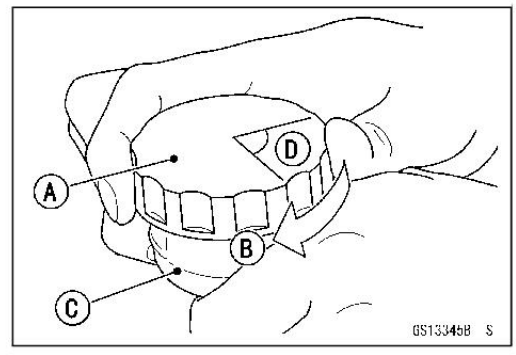

**⚠ WARNING**

**Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.**

**Recommended Disc Brake Fluid**
**Grade: DOT4**

● Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.




● Install the stopper to the reservoir.

● Tighten:

**Torque - Front Brake Reservoir Cap Stopper Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)**

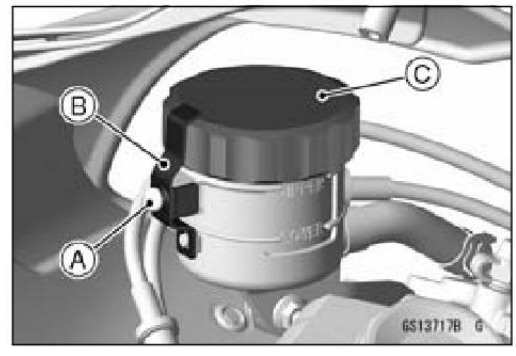
### *Brake Fluid Change*

**NOTE**

○*The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.*

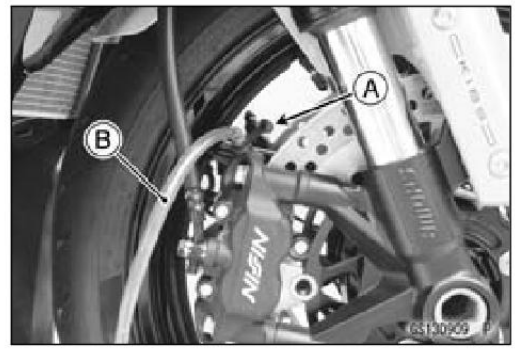
● Level the brake fluid reservoir.

● Remove:
Screw [A]
Stopper [B]
Front Brake Reservoir Cap [C]
Diaphragm Plate
Diaphragm



## Periodic Maintenance Procedures

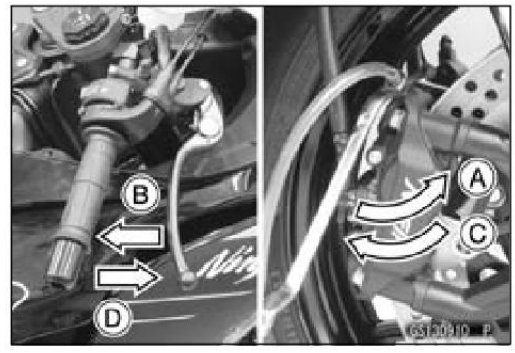
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.




- Change the brake fluid.

○Repeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

1. Open the bleed valve [A].
2. Apply the brake and hold it [B].
3. Close the bleed valve [C].
4. Release the brake [D].




**NOTE**

○*The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

○*Front Brake: Repeat the above steps for the other caliper.*

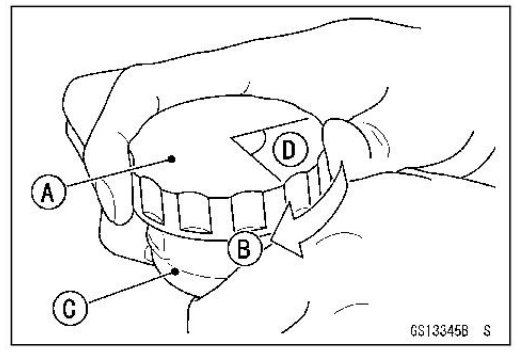
***NOTICE***

**Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.**

- Remove the clear plastic hose.
- Install the diaphragm and reservoir cap.

- Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.




- Install the stopper to the reservoir.
- Tighten:

**Torque - Front Brake Reservoir Cap Stopper Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)**

- Tighten the bleed valve, and install the rubber cap.

**Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

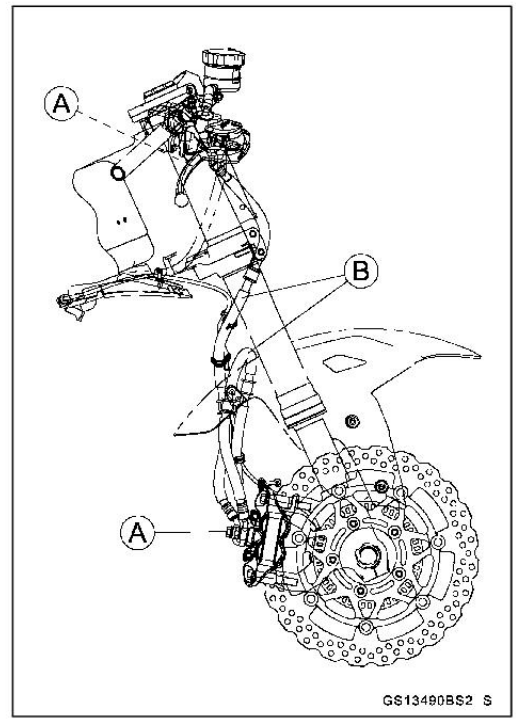
★If necessary, bleed the air from the lines.

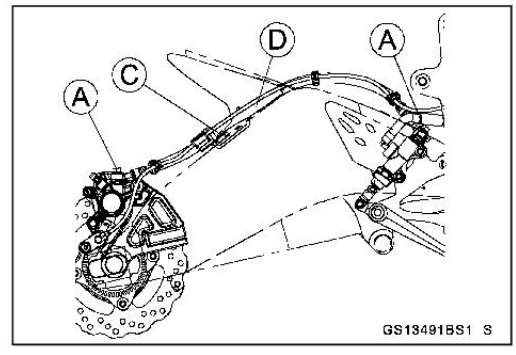
## Periodic Maintenance Procedures

### *Brake Hose and Pipe Replacement*

| *NOTICE* |
| --- |
| **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |

● Remove:
Upper Fairing (see Upper Fairing Removal(15-15))
Brake Hose Banjo Bolts [A] and Washers
Front Brake Hoses [B]
Rear Brake Hose Clamp Bolt [C]
Rear Brake Hose [D]
● Free the brake hose from the clamps and guides to remove the brake hoses.
● When removing the brake hoses, note the followings.
○Take care not to spill the brake fluid on the painted or plastic parts.
○Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
○Immediately wash away any brake fluid that spills.



## Periodic Maintenance Procedures

● For ABS equipped models, additionally remove the followings.
Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
Brake Pipe Joint Nuts [A]
Brake Pipe Banjo Bolts [B] and Washers
Front ABS Brake Pipes [C]
Rear ABS Brake Pipes [D]
Rear Brake Hose Mount Bolt [E]

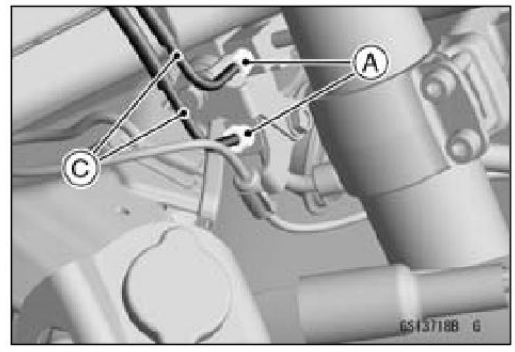
○Remove the rear fender mount bolt near the brake pipe and move the rear ABS brake pipe rearward then loosen the brake pipe joint nut.

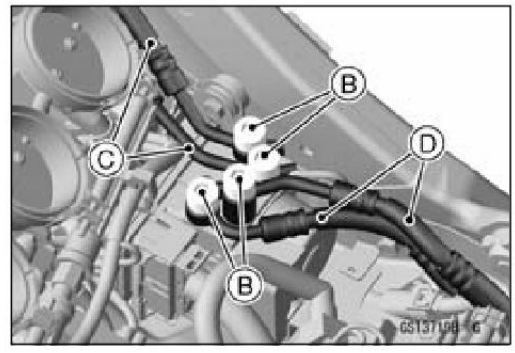
● Free the brake pipes from the clamps to remove the brake pipes.

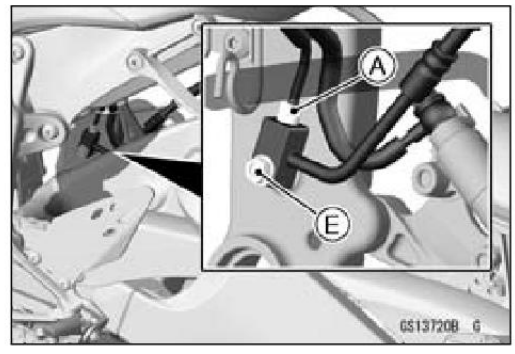
**NOTE**

○*When replace the brake pipe, do not try to separate rubber hose from the metal pipe. Handle the brake pipe as a unit.*

○*When removing the brake pipes and hoses on the hydraulic unit, remove them according to each assembly of the exploded view in the Brakes chapter.*



## Periodic Maintenance Procedures

● Install the brake hoses and brake pipes (ABS equipped models) in the reverse procedure, note the following.

**NOTE**

○*Be careful the mounting position of the front brake hose fitting on the caliper is different depending on the specification. For ABS equipped models, the front brake hose from the hydraulic unit should position inside of the brake hose which linked both calipers. For models without ABS, the front brake hose from the master cylinder should position outside of the brake hose which linked both calipers (see Cable, Wire, and Hose Routing section (18-2)).*

● Install:
Brake Hoses [A]
Brake Hoses [B] (ABS equipped models)
Brake Pipes [C] (ABS equipped models)
Washers [D]
Brake Hose Banjo Bolts [E]
Brake Pipe Joint Nuts [F] (ABS equipped models)
Brake Pipe Banjo Bolts [G] (ABS equipped models)

○Before installing the brake pipe, check to see that there is no damage on the threads of the brake pipe joint nut.

★If there is any damage, replace the damaged parts with new ones.

○Avoid sharp bending, kinking, flatting or twisting, and run the hoses and pipes correctly (see Cable, Wire, and Hose Routing section (18-2)).

○Replace the washers at both sides of the brake hose or pipe fittings with new ones.

**NOTE**

○*Connect the brake hose so that rests the pin on the brake hose fitting against the stopper near the fitting to make whirl stop of the fitting.*

○*Tighten the brake pipe joint nut and banjo bolt at both ends of the brake pipe temporarily and then tighten them to the specified torque.*

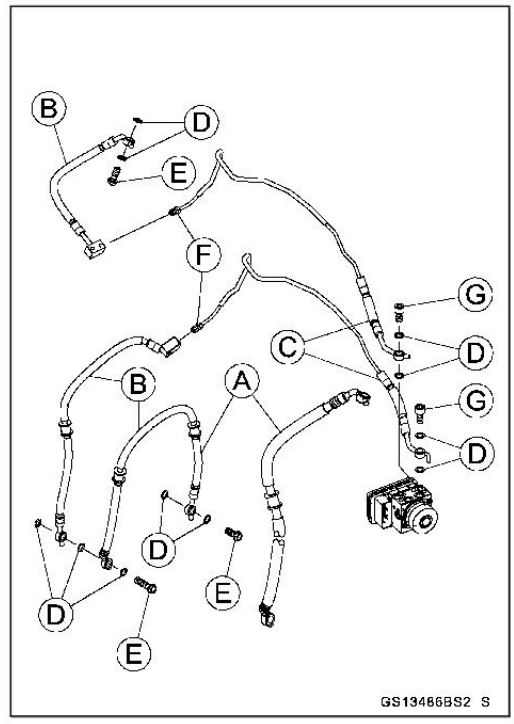
● Tighten the brake pipe joint nuts with the flare nut wrench.

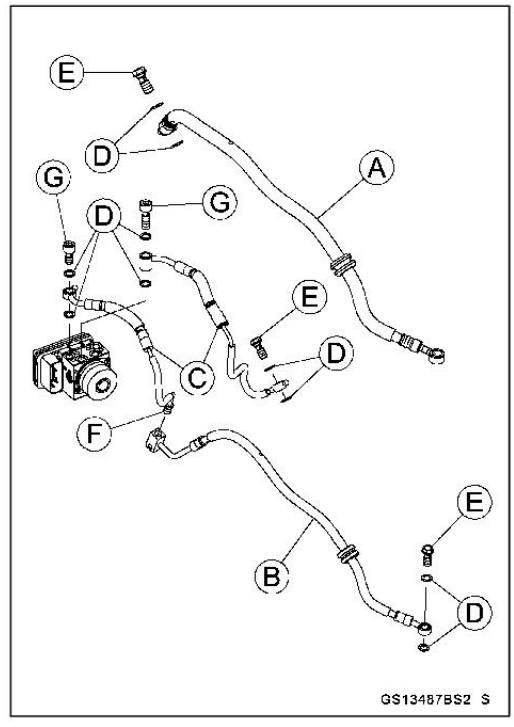
● Tighten:

**Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Brake Pipe Joint Nuts: 14.5 N·m (1.48 kgf·m, 10.7 ft·lb)**
**Brake Pipe Banjo Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)**

● Fill the brake line after installing the brake hose (see Brake Fluid Change(2-45)).

● Inspect the brake system for leaks.



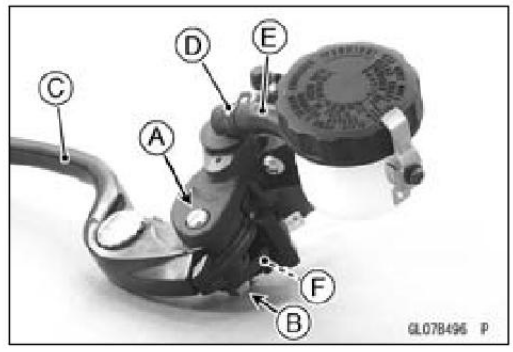

### *Master Cylinder Rubber Parts Replacement*

**Front Master Cylinder Disassembly**

● Remove the front master cylinder (see Front Master Cylinder Removal(12-18)).

## Periodic Maintenance Procedures

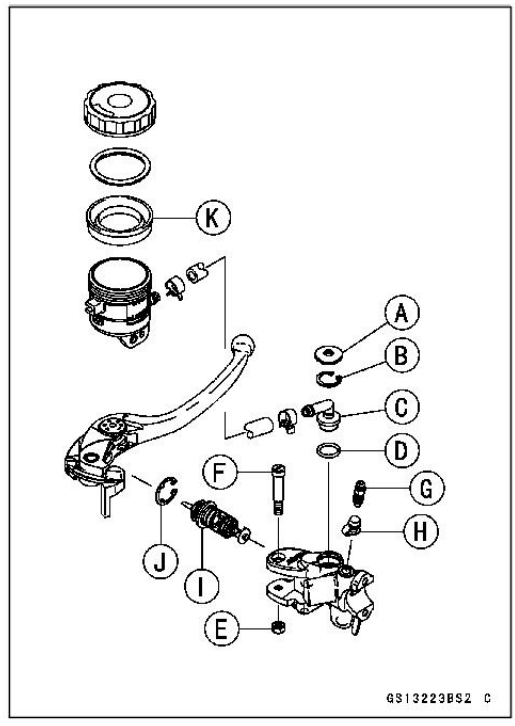
● Remove the followings if necessary.
Brake Lever Pivot Bolt [A] and Locknut [B]
Brake Lever [C]
Clamp [D]
Brake Hose [E]
Front Brake Light Switch [F]




● Remove the seal cover [A], circlip [B], connector [C] and O-ring [D].

**Special Tool - Inside Circlip Pliers: 57001-143**

● Remove the locknut [E] and pivot bolt [F], and remove the brake lever.
● Remove the bleed valve [G] and rubber cap [H].
● Remove the piston assembly [I] as follows.
○Remove the dust cover and push rod.
○Remove the circlip [J].
○Pull out the piston (with primary cup and secondary cup).
○Remove the return spring and spring guide.
● Replace:
Seal Cover [A]
Circlip [B]
O-ring [D]
Rubber Cap [H]
Piston Assembly [I]
Circlip [J]
Diaphragm [K]




**Rear Master Cylinder Disassembly**

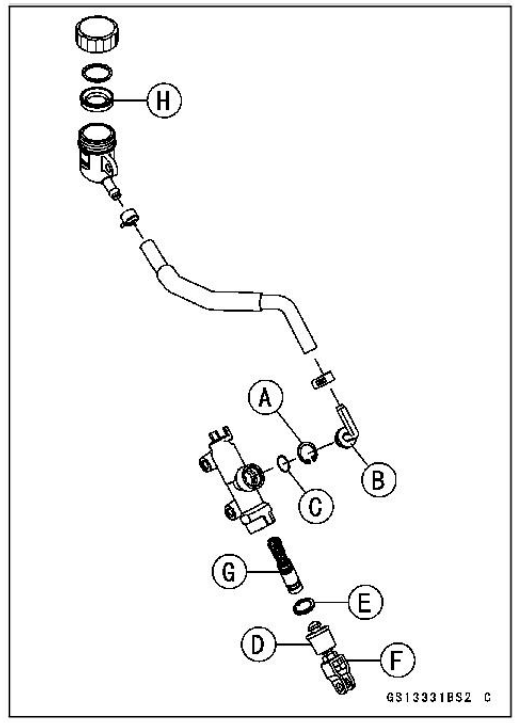
● Remove the rear master cylinder (see Rear Master Cylinder Removal(12-19)).
● Remove the circlip [A], connector [B] and O-ring [C].

**Special Tool - Inside Circlip Pliers: 57001-143**

● Slide the dust cover [D] out of place, and remove the circlip [E].
● Pull out the push rod assembly [F].
● Remove the piston assembly [G] and return spring.

| *NOTICE* |
| --- |
| **Do not remove the secondary cup from the piston since removal will damage it.** |

● Replace:
Circlip [A]
O-ring [C]
Circlip [E]
Push Rod Assembly [F]
Piston Assembly [G]
Diaphragm [H]



## Periodic Maintenance Procedures

### Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

| *NOTICE* |
| --- |
| **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.** |

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the followings.

  Front: Brake Lever Pivot Bolt

  Rear: Dust Cover of Push Rod Assembly

- For the front master cylinder, tighten the brake lever pivot bolt and the locknut.

  **Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)**
  **Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)**

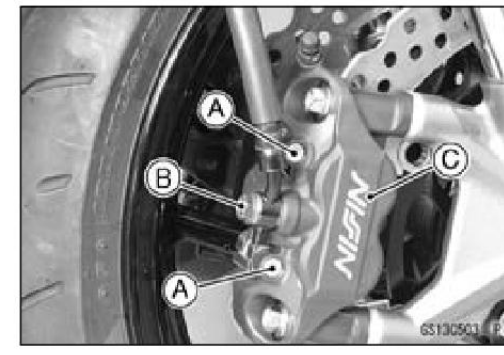
- For the front master cylinder, install the bleed valve and rubber cap.

  **Torque - Bleed Valve: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

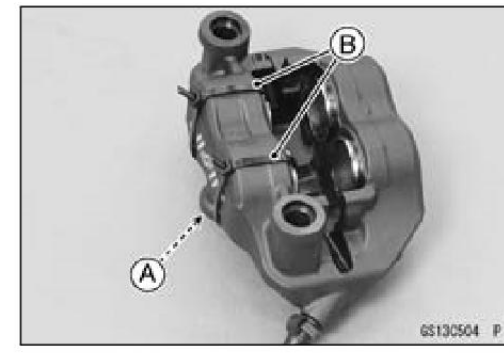
### *Caliper Rubber Parts Replacement*

#### Front Caliper Disassembly

- Loosen the front caliper pad pins [A] and banjo bolt [B] and tighten them loosely.
- Remove:
  Front Caliper [C] (see Front Caliper Removal(12-12))
  Brake Pads (see Front Brake Pad Removal(12-16))

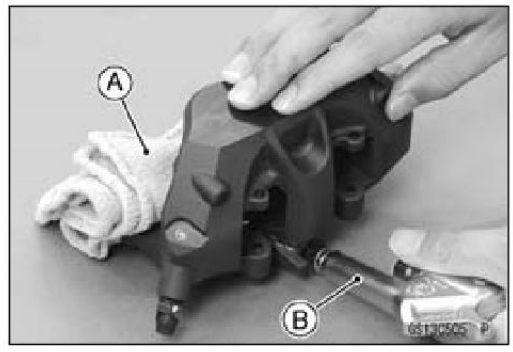



- Hold the pistons nearest the oil passage [A] with the bands [B].



## Periodic Maintenance Procedures

● Using compressed air, remove the pistons.
○Cover the caliper opening with a clean heavy cloth [A].
○Lightly apply compressed air [B] to the oil passage.



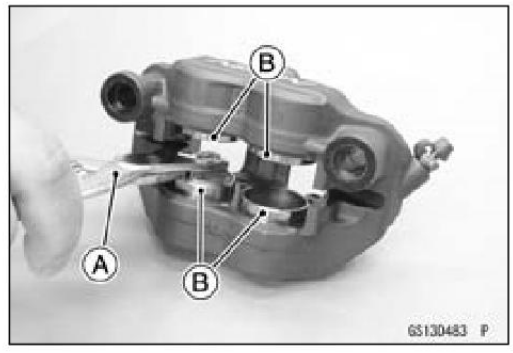

**⚠ WARNING**

**The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.**

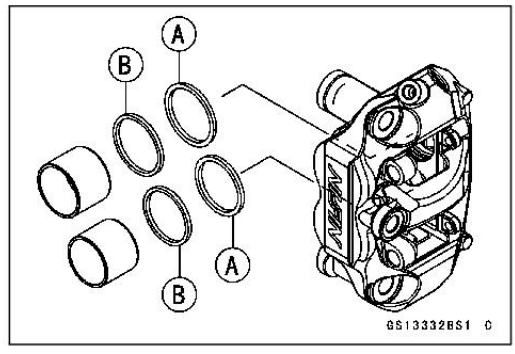
○Pull out the pistons by hand.

● When compressed air is not used, use the brake caliper piston pliers [A] to remove the pistons [B].

**Special Tool - Brake Caliper Piston Pliers (φ16 – φ26): 57001-1861**




● Remove the dust seals [A] and fluid seals [B].
● Cut the band.
● Repeat the previous step to remove the pistons from the other side of the caliper body.
● Remove the bleed valve and rubber cap.




**Front Caliper Assembly**

● Clean the caliper parts except for the pads.

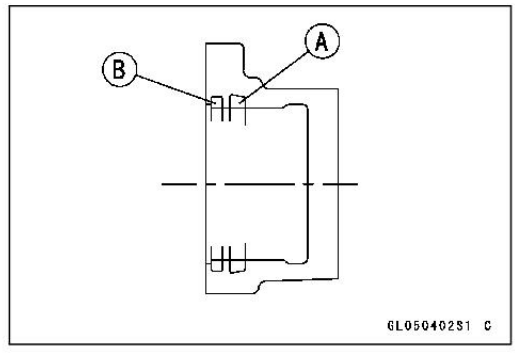
***NOTICE***

**For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.**

● Install the bleed valve and rubber cap.

**Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

● Replace the fluid seals [A] with new ones.
○Apply silicone grease to the fluid seals, and install them into the cylinders by hand.
● Replace the dust seals [B] with new ones if they are damaged.
○Apply silicone grease to the dust seals, and install them into the cylinders by hand.

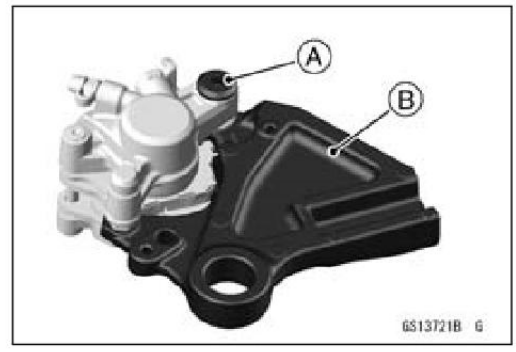



● Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.
● Install the removed parts.
● Wipe up any spilled brake fluid on the caliper with wet cloth.

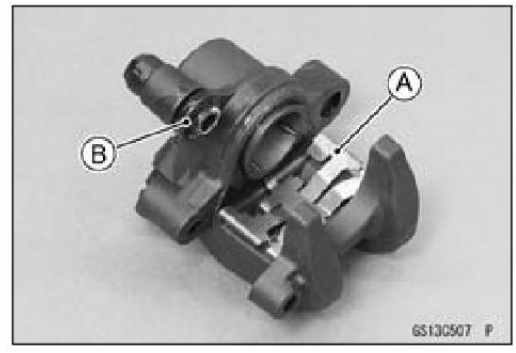
## Periodic Maintenance Procedures

### Rear Caliper Disassembly

● Remove:
Rear Caliper (see Rear Caliper Removal(12-12))
Brake Pads (see Rear Brake Pad Removal (12-17))
Rear Caliper Pin Bolt [A]
Caliper Bracket [B]



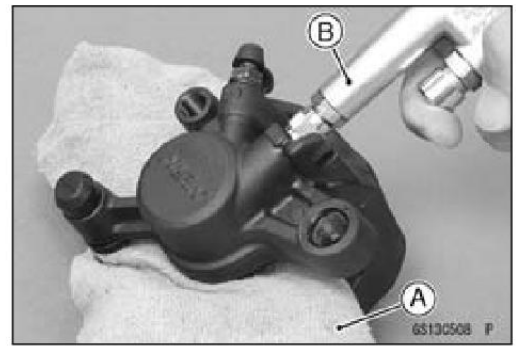

● Remove:
Pad Spring [A]
Dust Boot [B]




● Using compressed air, remove the piston.
○Cover the caliper opening with a clean heavy cloth [A].
○Remove the piston by lightly applying compressed air [B] to where the brake line fits into the caliper.

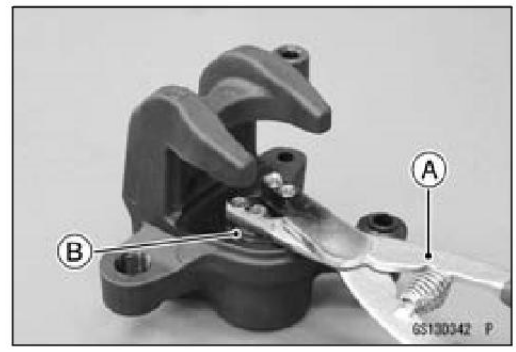
**⚠ WARNING**

**The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.**




● When compressed air is not used, using the brake caliper piston pliers [A] remove the piston [B].

**Special Tool - Brake Caliper Piston Pliers (φ16 – φ26): 57001-1861**




● Remove the dust seal and fluid seal.
● Remove the bleed valve and rubber cap.

### Rear Caliper Assembly

● Clean the caliper parts except for the pads.

***NOTICE***

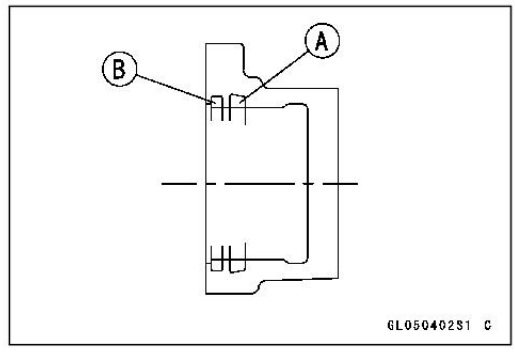
**For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.**

● Install the bleed valve and rubber cap.
● Tighten:

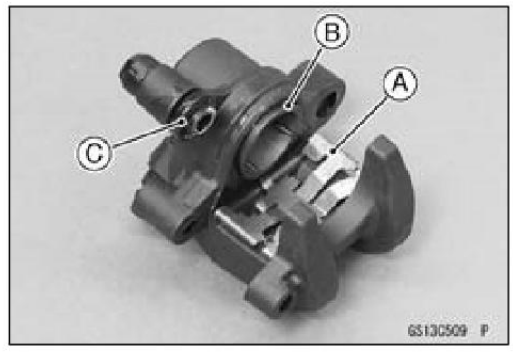
**Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

## Periodic Maintenance Procedures

● Replace the fluid seal [A] with a new one.
○Apply silicone grease to the fluid seal, and install it into the cylinder by hand.
● Replace the dust seal [B] with a new one.
○Apply silicone grease to the dust seal, and install it into the cylinder by hand.



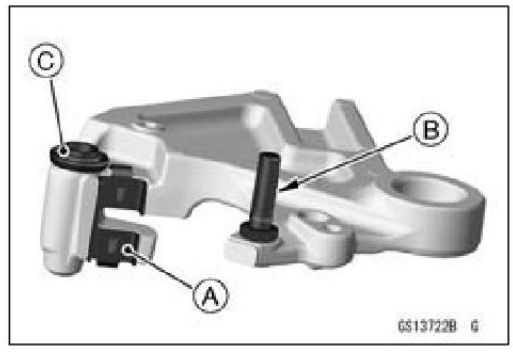

● Install the pad spring [A] in the caliper as shown.
● Apply brake fluid to the outside of the piston [B], and push it into the cylinder by hand.
● Replace the and dust boot [C].




● Install the pad spring [A] on the caliper bracket as shown.
● Apply a silicone grease to the caliper bracket shaft [B].
● Replace the friction boot [C].
● Assemble the caliper and the caliper bracket.
● Apply silicone grease to the rear caliper pin bolt.
● Tighten:

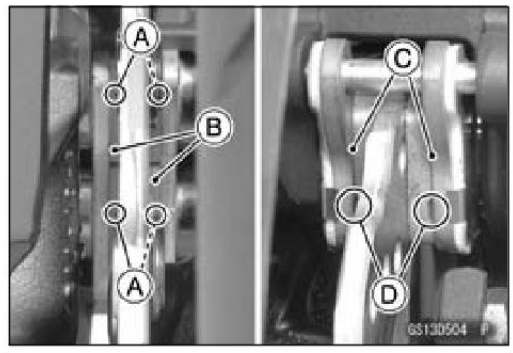
**Torque - Rear Caliper Pin Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)**

● Install the pads (see Rear Brake Pad Installation(12-17)).
● Wipe up any spilled brake fluid on the caliper with wet cloth.




### *Brake Pad Wear Inspection*

● Clean the brake calipers especially around the brake pads.
● Visually inspect the lining thickness of the brake pads in each caliper.
○Use an inspection mirror as required.
★If the wear indicators [A] of the front brake pads [B] cannot be seen (i.e. worn out), or the rear brake pads [C] has been worn until the wear indicator [D], remove the brake pads (see Front Brake Pad Removal(12-16)) (see Rear Brake Pad Installation(12-17)) and inspect them as follows.



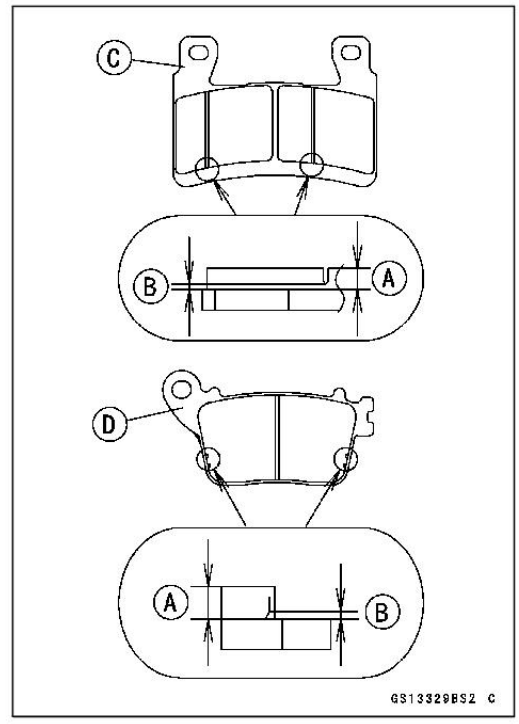
## Periodic Maintenance Procedures

- Check the lining thickness [A] of the pads in each caliper.

★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.
Front Brake Pad [C]
Rear Brake Pad [D]

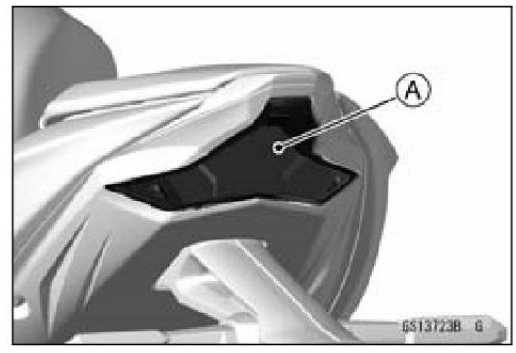
**Pad Lining Thickness**

| | |
|---|---|
| **Standard:** | |
| **Front** | **4 mm (0.16 in.)** |
| **Rear** | **5 mm (0.20 in.)** |
| **Service Limit:** | **1 mm (0.04 in.)** |



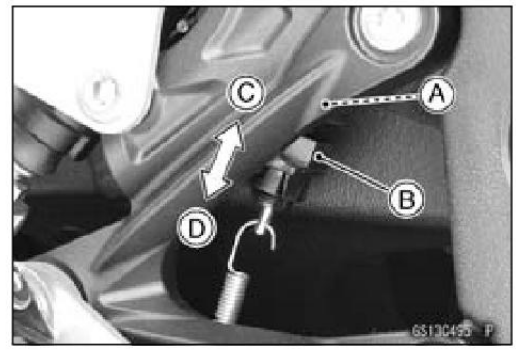

### *Brake Light Switch Operation Inspection*

- Turn the ignition switch on.
- The brake light [A] should go on when the brake lever is applied or after the brake pedal is depressed about 10 mm (0.39 in.).




★If it does not, adjust the brake light switch.

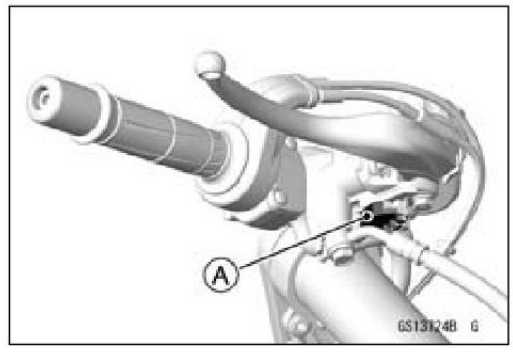
- While holding the switch body, turn the adjusting nut to adjust the switch.
Switch Body [A]
Adjusting Nut [B]
Light sooner as the body rises [C]
Light later as the body lowers [D]




| *NOTICE* |
|---|
| **To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.** |

## Periodic Maintenance Procedures

★If it does not go on, inspect or replace the following parts.
Battery (see Charging Condition Inspection(16-29))
Brake Light (see Brake/Tail Light Removal(16-53))
Main Fuse 30 A and Brake Light/Horn Fuse 7.5 A (see Fuse Inspection(16-106))
Front Brake Light Switch [A] (see Switch Inspection(16-98))
Rear Brake Light Switch (see Switch Inspection(16-98))
Harness (see Wiring Inspection(16-23))



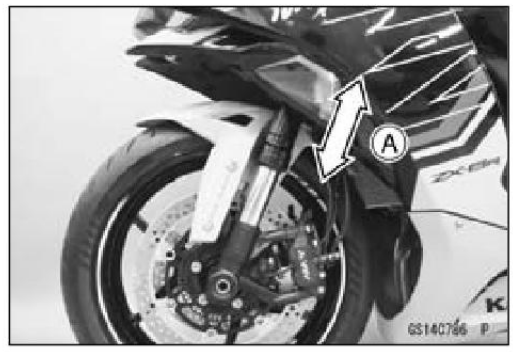

## Suspension

### *Suspension System*

**Front Forks/Rear Shock Absorber Operation Inspection**

- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change(13-12)).




- Pump the rear seat down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak.

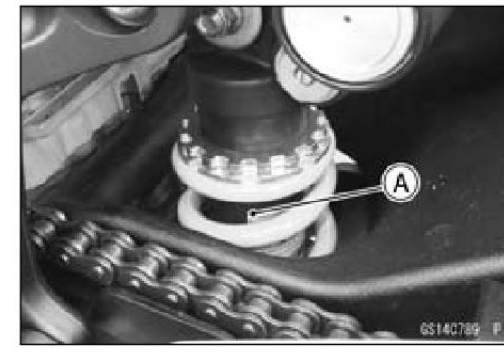
**Front Fork Oil Leak Inspection**

- Visually inspect the front forks [A] for oil leakage.

★Replace or repair any defective parts, if necessary.

## Periodic Maintenance Procedures

### Rear Shock Absorber Oil Leak Inspection

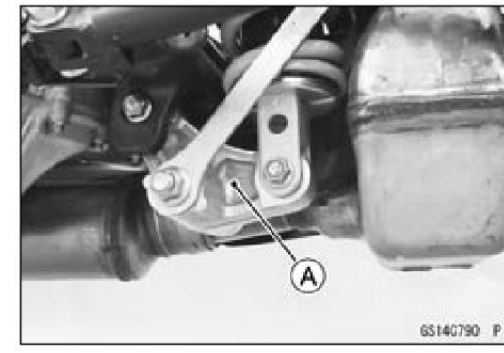



- Visually inspect that there is no oil stain on the parts around the rear shock absorber [A].

○Since the rear shock absorber body and the piston rod are covered, it is difficult to inspect directly.

★If the oil leakage is found on it, replace the shock absorber with a new one.

### Rocker Arm Operation Inspection




- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the rocker arm [A] does not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection(13-33)).

○In this photo, the left lower fairing has been removed for clarity.

### Tie-Rod Operation Inspection

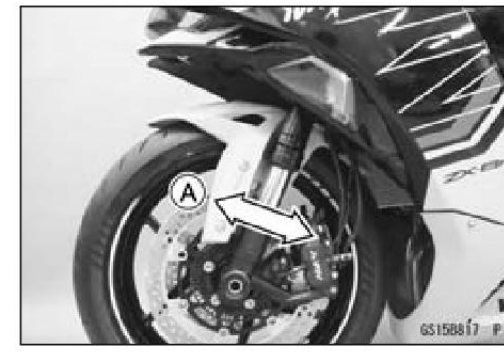
- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the tie-rod [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection(13-33)).

○In this photo, the left lower fairing has been removed for clarity.

## Steering

### *Steering Play Inspection*




- Raise the front wheel off the ground with the jack (see Front Wheel Removal(10-6)).

**Special Tools - Jack: 57001-1238**
**Jack Attachment: 57001-1608**

- With the front wheel pointing straight ahead, alternately tap each end of the handlebar. The front wheel should swing fully left and right from the force of gravity until the fork hits the stop.

★If the wheel binds or catches before the stop, the steering is too tight.

- Feel for steering looseness by pushing and pulling [A] the forks.

★If you feel looseness, the steering is too loose.

**NOTE**

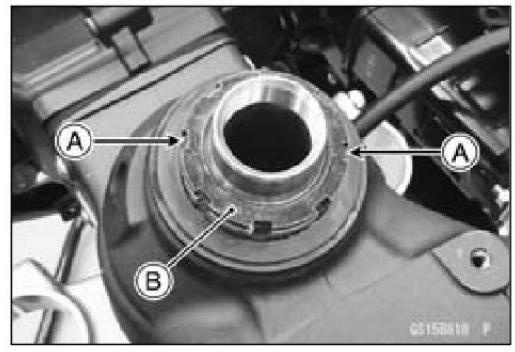
○*The cables and wiring will have some effect on the motion of the fork which must be taken into account.*

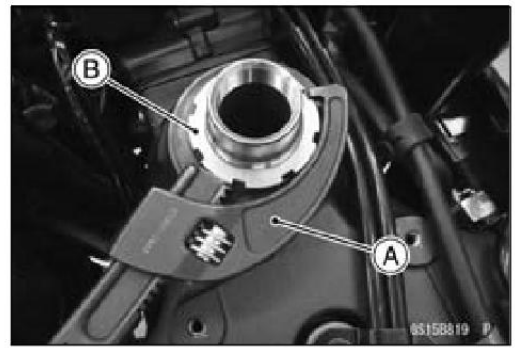
○*Be sure the leads and cables are properly routed.*

○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

## Periodic Maintenance Procedures

### *Steering Play Adjustment*




- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Steering Stem Head with Handlebars (see Handlebar Removal(14-10)).
- Bend the claws [A] of the claw washer straighten.
- Remove the steering stem locknut [B].

**Special Tool - Steering Stem Nut Wrench: 57001-1100**
**or Adjustable Hook Wrench: 57001–1863**

- Remove the claw washer.
- Adjust the steering.

**Special Tool - Steering Stem Nut Wrench: 57001-1100**
**or Adjustable Hook Wrench [A]: 57001–1863**

★If the steering is too tight, loosen the stem nut [B] a fraction of a turn.
★If the steering is too loose, tighten the stem nut a fraction of a turn.

**NOTE**

○*Turn the stem nut 1/8 turn at time maximum.*

- Install:
  Claw Washer and Stem Locknut (see Stem, Stem Bearing Installation(14-7))
  Front Forks (see Front Fork Installation (Each Fork Leg)(13-11))
  Steering Stem Head and Handlebar (see Handlebar Installation(14-12))

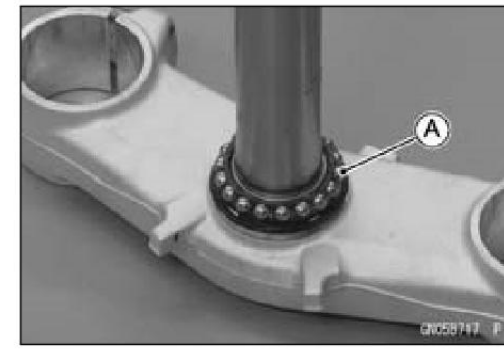
**⚠ WARNING**

**If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).**

- Check the steering again.
★If the steering is still too tight or too loose, repeat the adjustment.
- Install the removed parts.

## Periodic Maintenance Procedures

### *Steering Stem Bearing Lubrication*




- Remove the steering stem (see Stem, Stem Bearing Removal(14-6)).
- Using a high flash-point solvent, wash the upper and lower ball bearings [A] in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.

★Replace the bearing assemblies if they show wear or damage.

- Pack the upper and lower ball bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation(14-7)).
- Adjust the steering (see Steering Play Adjustment(2-58)).

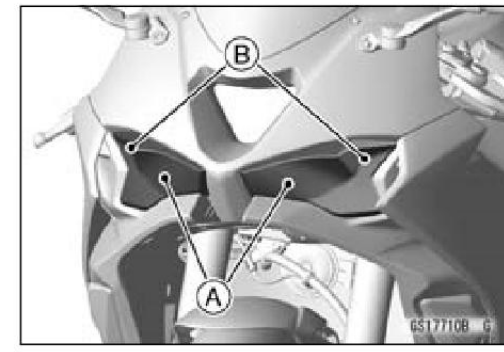
## Electrical System

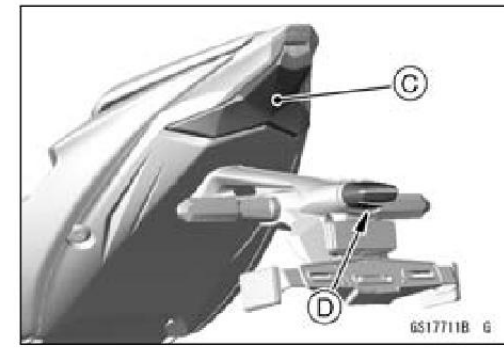
### *Lights and Switches Operation Inspection*

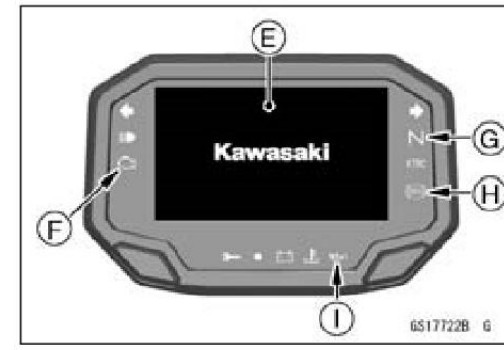
**First Step**

- Set the gear position in the neutral position.
- Turn the ignition switch on.
- The following lights should go on according to below table.

| |
|---|
| Headlights [A] |
| City Lights [B] |
| Taillight [C] |
| License Plate Light [D] |
| Meter Panel LCD [E] |
| Yellow Engine Warning Indicator Light [F] |
| Green Neutral Indicator Light [G] |
| Yellow ABS Indicator Light (ABS Equipped Models) [H] |
| Oil Pressure Warning Indicator [I] |




★If the light does not go on, inspect or replace the following parts.

Battery (see Charging Condition Inspection(16-29))
Headlight Unit (see Upper Fairing Disassembly(15-17))
Brake/Tail Light (see Brake/Tail Light Removal(16-53))
License Plate Light
Meter Panel LCD (see Meter Unit Inspection(16-67))
Green Neutral Indicator Light (see Meter Unit Inspection(16-67))
Red Warning Indicator Light (Oil Pressure Warning) (see Meter Unit Inspection(16-67))
ECU (see ECU Power Supply Inspection(3-13))
Main Fuse 30 A, Ignition Fuse 15 A, Headlight Fuse 15 A, Meter Fuse 7.5 A and Brake Light/Horn Fuse 7.5 A (see Fuse Inspection(16-106))
Ignition Switch (see Switch Inspection(16-98))
Oil Pressure Switch (see Switch Inspection(16-98))
Gear Position Switch (see Gear Position Switch Inspection(16-100))
Harness (see Wiring Inspection(16-23))
Yellow ABS Indicator Light (ABS Equipped models) (see ABS Indicator Light and KIBS Warning Message Inspection(12-30))

## Periodic Maintenance Procedures

- Turn the ignition switch off.
- The all lights should go off.

○For immobilizer system equipped models, red warning indicator light will blinks. Refer to the Immobilizer System (Equipped Models) section.

★If the light does not go off, replace the ignition switch.

**Second Step**

- Turn the ignition switch on.
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The green turn signal indicators [C] in the meter unit should blink.

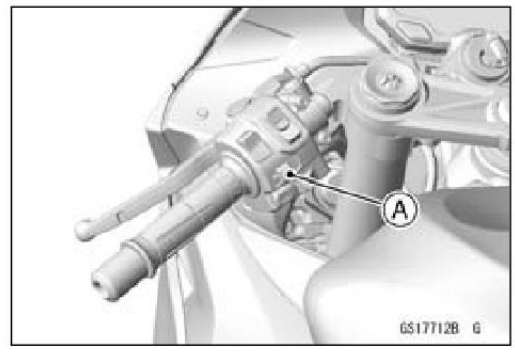
★If the each light does not blink, inspect or replace the following parts.

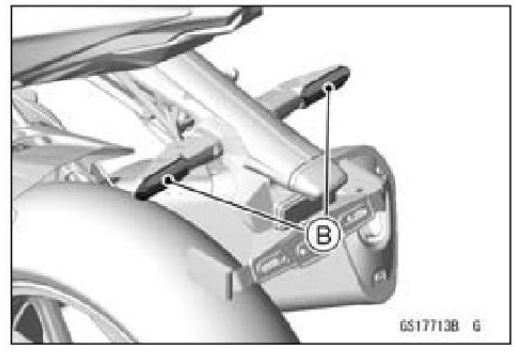
Turn Signal Light (see Middle Inner Fairing Disassembly(15-14)) (see Flap Disassembly(15-27))
Green Turn Signal Indicator Light (see Meter Unit Inspection(16-67))
Turn Signal Relay Fuse 7.5 A (see Fuse Inspection(16-106))
Turn Signal Switch (see Switch Inspection(16-98))
Turn Signal Relay (see Turn Signal Relay Inspection(16-56))
Harness (see Wiring Inspection(16-23))

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light should go off.

★If the light does not go off, inspect or replace the following parts.

Turn Signal Switch (see Switch Inspection(16-98))
Turn Signal Relay (see Turn Signal Relay Inspection(16-56))



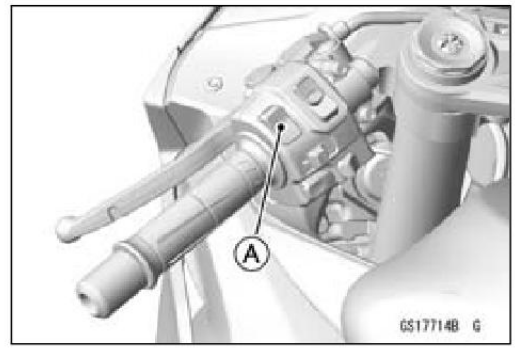



**Third Step**

- Set the dimmer switch [A] to low beam position.
- Turn the ignition switch on.
- The low beam headlights should go on.

★If the low beam headlights do not go on, inspect or replace the following parts.

Headlight Unit (see Upper Fairing Disassembly(15-17))
Headlight Fuse 15 A (see Fuse Inspection(16-106))
Dimmer Switch (see Switch Inspection(16-98))
Headlight Relay (see Relay Circuit Inspection(16-101))
Harness (see Wiring Inspection(16-23))

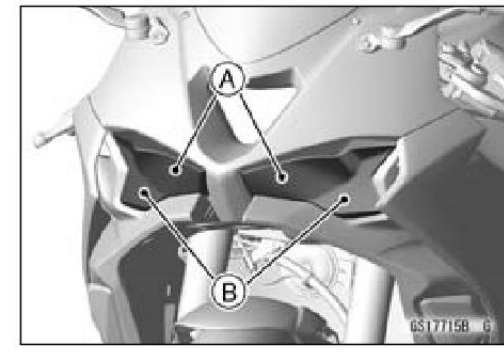


## Periodic Maintenance Procedures

- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The blue high beam indicator light [C] should goes on.

★If the high beam headlight and/or blue high beam indicator light does not go on, inspect or replace the following parts.
Headlight Unit (see Upper Fairing Removal(15-15))
Dimmer Switch (see Switch Inspection(16-98))

- Turn the ignition switch off.
- The headlights and blue high beam indicator light should go off.



### *Headlight Aiming Inspection*

- Inspect the headlight beam for aiming.

★If the headlight beam points to one side rather than straight ahead, adjust the horizontal beam.

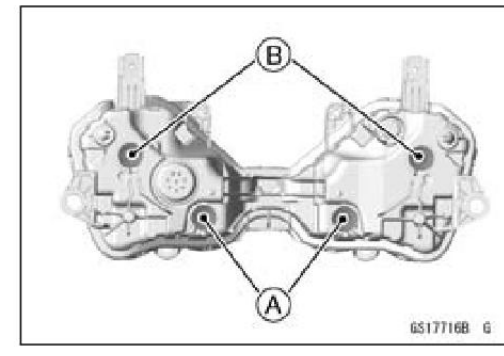
**Headlight Beam Horizontal Adjustment**

- Turn the horizontal adjusters [A] in both headlights in or out until the beam points straight ahead.

★If the headlight beam points too low or high, adjust the vertical beam.

**Headlight Beam Vertical Adjustment**

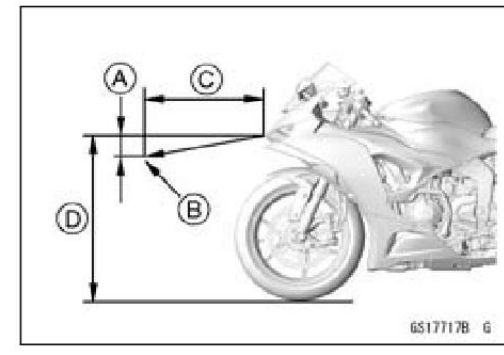
- Turn the vertical adjuster [B] in both headlights in or out to adjust the headlight vertically.




**NOTE**

○*On high beam, the brightest points should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*

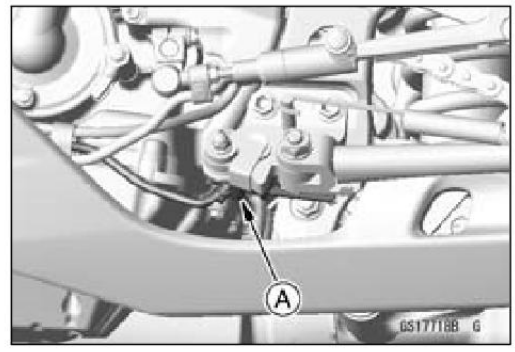
○*For the US model, the proper angle is 0.4 degrees below horizontal. This is 50 mm (2.0 in.) drop at 7.6 m (25 ft) measured from the center of the headlight with the motorcycle on its wheels and the rider seated.*




50 mm (2.0 in.) [A]
Center of Brightest Spot [B]
7.6 m (25 ft) [C]
Height of Headlight Center [D]

## Periodic Maintenance Procedures

### *Side Stand Switch Operation Inspection*




- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal(10-7)).
- Inspect the side stand switch [A] operation accordance to below table.

**Side Stand Switch Operation**

| Side Stand | Gear Position | Clutch Lever | Engine Start | Engine Run |
|---|---|---|---|---|
| Up | Neutral | Released | Starts | Continue running |
| Up | Neutral | Pulled in | Starts | Continue running |
| Up | In Gear | Released | Does not start | Continue running |
| Up | In Gear | Pulled in | Starts | Continue running |
| Down | Neutral | Released | Starts | Continue running |
| Down | Neutral | Pulled in | Starts | Continue running |
| Down | In Gear | Released | Does not start | Stops |
| Down | In Gear | Pulled in | Does not start | Stops |

★If the side stand switch operation does not work, inspect or replace the following parts.
Battery (see Charging Condition Inspection(16-29))
Main Fuse 30 A (see Fuse Inspection(16-106))
Ignition Fuse 15 A (see Fuse Inspection(16-106))
Ignition Switch (see Switch Inspection(16-98))
Side Stand Switch (see Switch Inspection(16-98))
Engine Stop Switch (see Switch Inspection(16-98))
Starter Button (see Switch Inspection(16-98))
Gear Position Switch (see Gear Position Switch Inspection(16-100))
Starter Lockout Switch (see Switch Inspection(16-98))
Starter Relay (see Starter Relay Inspection(16-50))
Relay Box (see Relay Circuit Inspection(16-101))
Starter Circuit Relay (see Relay Circuit Inspection(16-101))
Harness (see Wiring Inspection(16-23))
★If the all parts are good condition, replace the ECU.

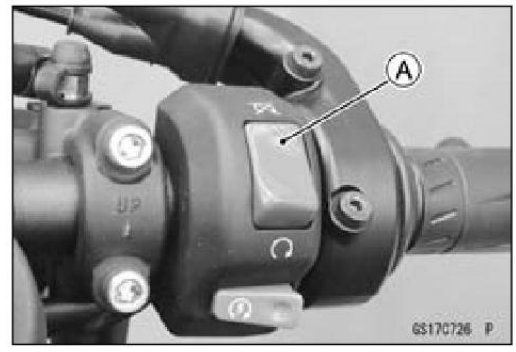
## Periodic Maintenance Procedures

### *Engine Stop Switch Operation Inspection*

**First Step**

- Turn the ignition switch on.
- Set the gear position in the neutral position.
- Turn the engine stop switch to stop position [A].
- Push the starter button.
- The engine does not start.

★If the engine starts, inspect or replace the engine stop switch (see Switch Inspection(16-98)).

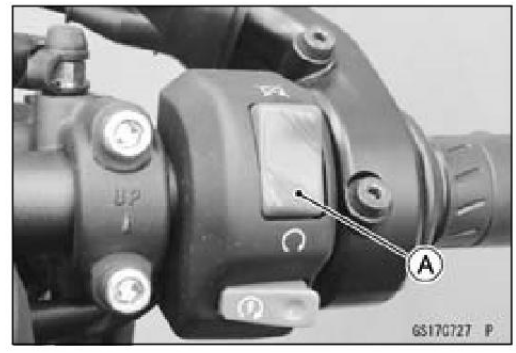



**Second Step**

- Turn the ignition switch on.
- Set the gear position in the neutral position.
- Turn the engine stop switch to run position [A].
- Push the starter button and start the engine.
- Turn the engine stop switch to stop position.
- Immediately the engine should be stop.

★If the engine does not stop, inspect or replace the engine stop switch (see Switch Inspection(16-98)).

★If the engine stop switch is good condition, replace the ECU.



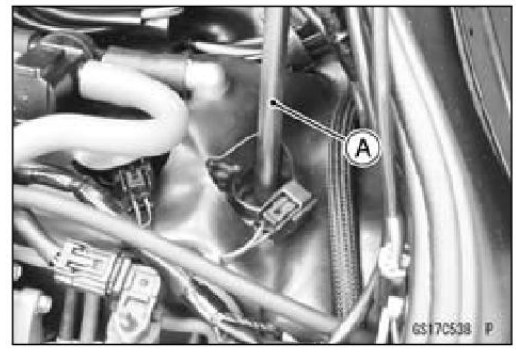

### *Spark Plug Replacement*

- Remove the stick coils (see Stick Coil Installation(16-41)).
- Remove the spark plugs using the 16 mm (0.63 in.) plug wrench [A] vertically.

**Special Tool - Spark Plug Wrench, Hex16: 57001-1262**

- Replace the spark plugs with new ones.

**Standard Spark Plug**
**Type: NGK CR9E**




- Insert the spark plug vertically into the spark plug hole with the spark plug installed in the plug wrench, and finger -tighten it first.

**Special Tool - Spark Plug Wrench, Hex16: 57001-1262**

| *NOTICE* |
| --- |
| **If tightening the spark plug with the wrench inclined, the insulator of the spark plug may break.** |

- Tighten:

**Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)**

- Install the stick coils (see Stick Coil Installation(16-41)).
- After installation, be sure the stick coils are installed securely by pulling up them lightly.

## Periodic Maintenance Procedures

### Others

***Chassis Parts Lubrication***

- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

**NOTE**

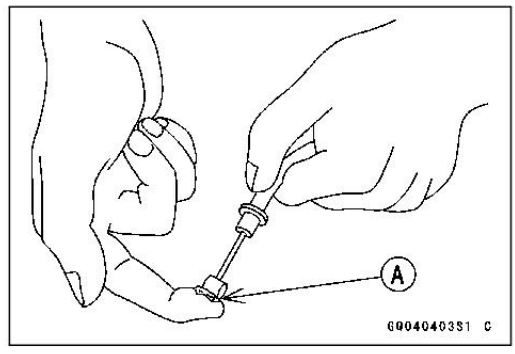
○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

**Pivots: Lubricate with Grease.**

Brake Lever
Brake Pedal
Clutch Lever
Rear Master Cylinder Push Rod Joint Pin
Side Stand

**Points: Lubricate with Grease.**

Clutch Inner Cable Upper and Lower Ends [A]
Throttle Inner Cable Upper and Lower Ends

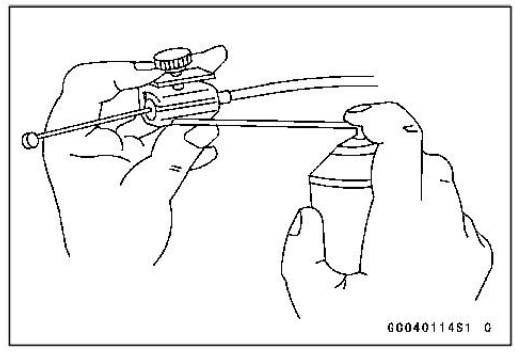



**Cables: Lubricate with Rust Inhibitor.**

Clutch Cable
Throttle Cables

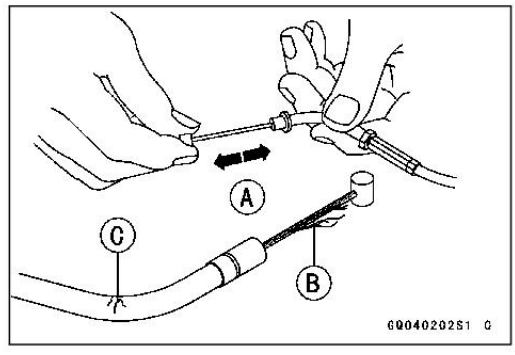
- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.




- With the cable disconnected at both ends, the inner cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



## Periodic Maintenance Procedures

### *Condition of Bolts, Nuts and Fasteners Tightness Inspection*

● Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

**NOTE**

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

**Bolt, Nut and Fastener to be checked**

Engine:
- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bolts and Nuts
- Exhaust Pipe Clamp Bolt
- Exhaust Pipe Holder Nuts
- Muffler Body Clamp Bolt
- Muffler Body Bolt
- Premuffler Chamber Bracket Bolt
- Premuffler Chamber Bolt
- Radiator Bolts

Wheels:
- Front Axle Clamp Bolts
- Front Axle
- Rear Axle Nut
- Rear Axle Nut Cotter Pin

Brakes:
- Brake Lever Pivot Bolt Locknut
- Brake Pedal Bolt
- Front Caliper Bolts
- Front Master Cylinder Clamp Bolts
- Rear Master Cylinder Bolts
- Rear Master Cylinder Push Rod Joint Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Rear Shock Absorber Nuts
- Swingarm Pivot Shaft Nut
- Tie-Rod Nuts
- Rocker Arm Nut

Steering:
- Handlebar Clamp Bolts
- Steering Stem Head Bolt

Others:
- Footpeg Bracket Bolts
- Front Fender Bolts
- Rear Frame Bolts
- Side Stand Bolt
- Side Stand Bracket Bolts

# Fuel System (DFI)

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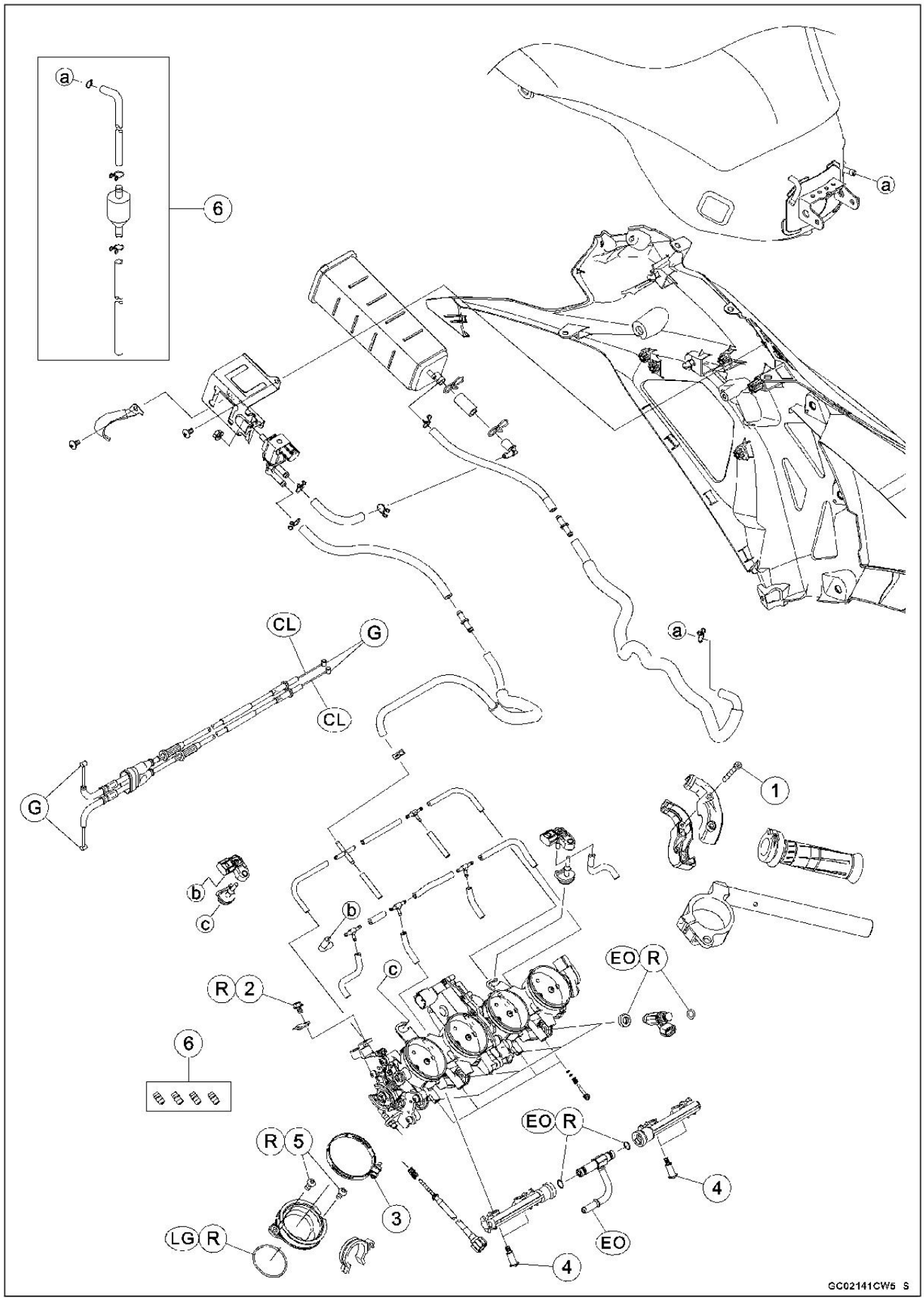
## Exploded View

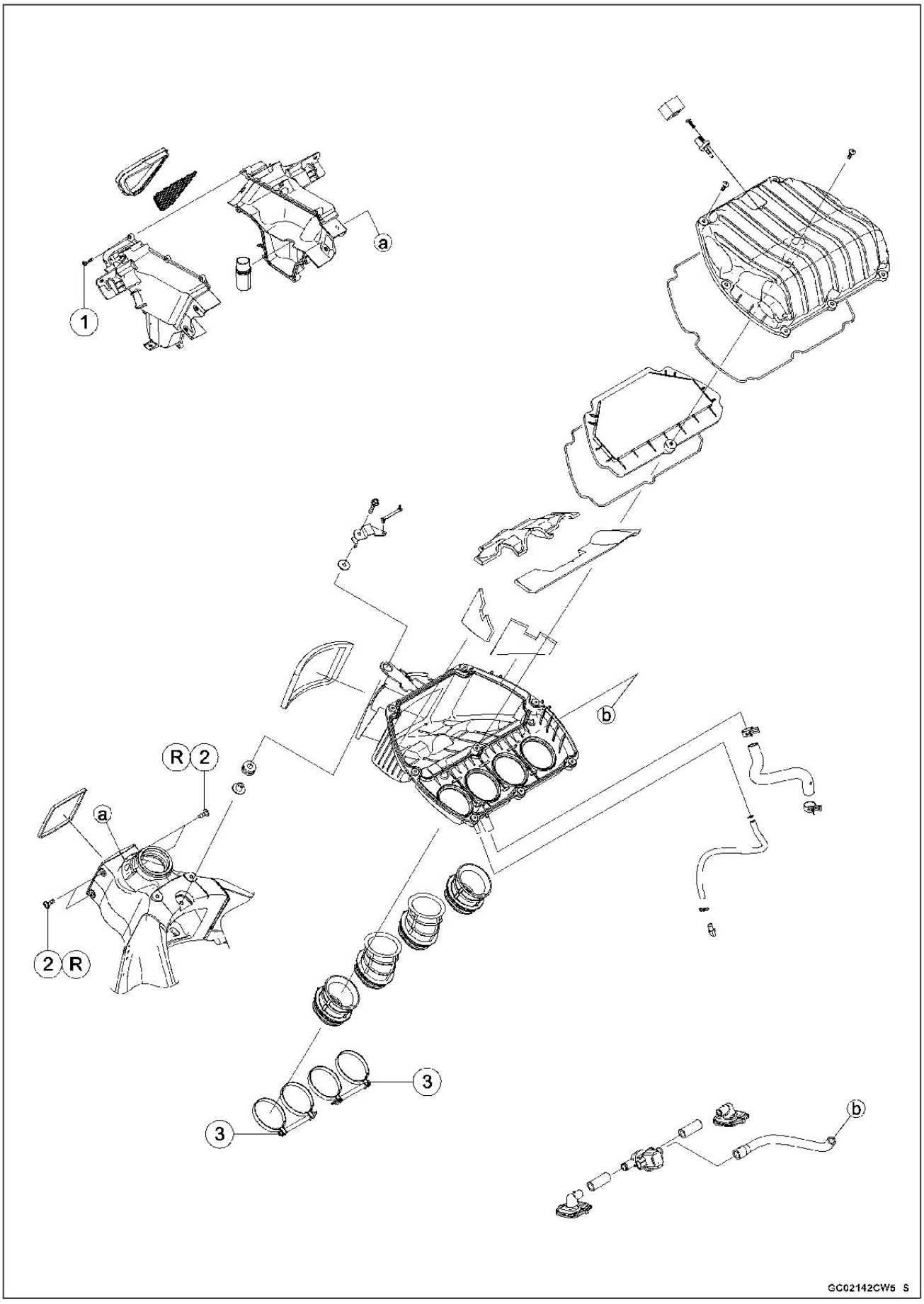


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Throttle Case Bolts | 2.4 | 0.24 | 21 in·lb | |
| 2 | Throttle Cable Holding Plate Bolt | 4.0 | 0.41 | 35 in·lb | R |
| 3 | Throttle Body Assy Holder Clamp Bolts | 3.0 | 0.31 | 27 in·lb | |
| 4 | Delivery Pipe Screws | 3.4 | 0.35 | 30 in·lb | |
| 5 | Throttle Body Assy Holder Bolts | 12 | 1.2 | 106 in·lb | R |

6. US and CA Models
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
LG: Apply liquid gasket.
R: Replacement Parts

## Exploded View

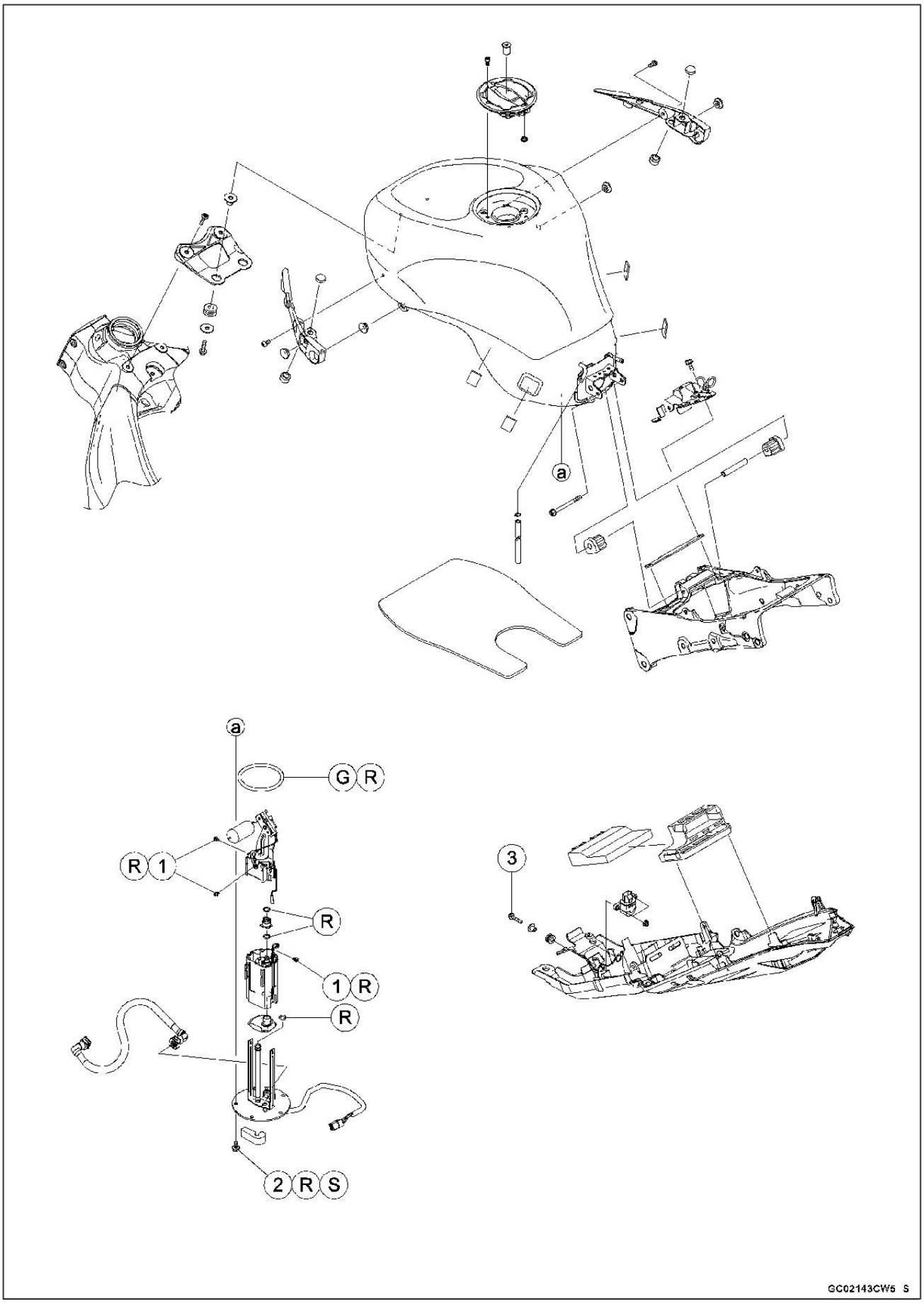


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Air Intake Duct Assembly Screws | 3.0 | 0.31 | 27 in·lb | |
| 2 | Air Intake Duct Bolts | 10 | 1.0 | 89 in·lb | R |
| 3 | Air Cleaner Housing Clamp Bolts | 1.5 | 0.15 | 13 in·lb | |

R: Replacement Parts

## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Fuel Pump Assembly Screws | 0.98 | 0.10 | 8.7 in·lb | R |
| 2 | Fuel Pump Bolts | 10 | 1.0 | 89 in·lb | R, S |
| 3 | Vehicle-down Sensor Bolts | 6.0 | 0.61 | 53 in·lb | |

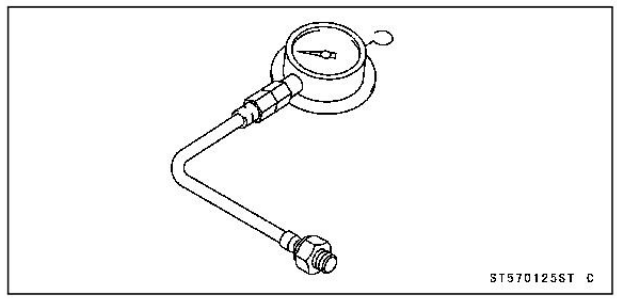
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

## Specifications

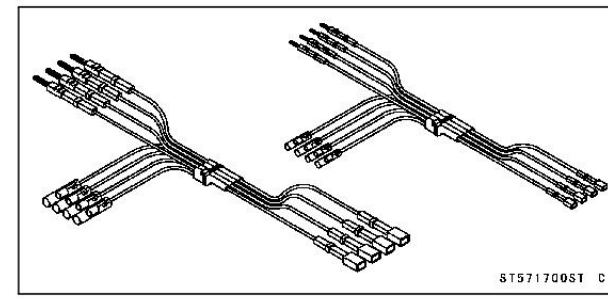
| Item | Standard |
|---|---|
| **Digital Fuel Injection System** | |
| Idle Speed | 1 300 ±50 r/min (rpm) |
| Throttle Body Assy: | |
| Throttle Valve | Dual Throttle Valve |
| Bore | $\phi$38 mm (1.5 in.) |
| Throttle Body Vacuum | 31.3 ±1.33 kPa (235 ±10 mmHg) at ilde speed |
| Bypass Screws (Turn Out) | 0 – 2 1/2 (for reference) |
| ECU: | |
| Make | DENSO |
| Type | Digital memory type, with built in IC igniter, sealed with resin |
| Fuel Pressure (High Pressure Line) | 294 kPa (3.0 kgf/cm², 43 psi) with engine idling |
| Fuel Pump: | |
| Type | In-tank pump |
| Discharge | 50 mL (1.7 US oz.) or more for 3 seconds |
| **Air Cleaner** | |
| Air Cleaner Element | Viscous paper element |
| **CAN Communication Line** | |
| Resistance (at ECU Terminals) | About 120 Ω |

## Special Tools and Sealant

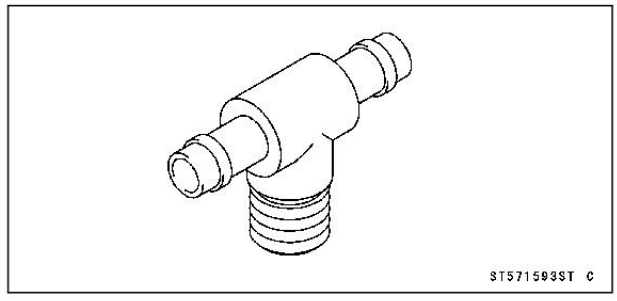
**Oil Pressure Gauge, 5 kgf/cm²:**
**57001-125**



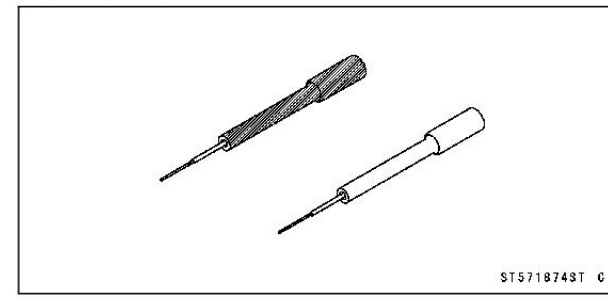

**Measuring Adapter:**
**57001-1700**



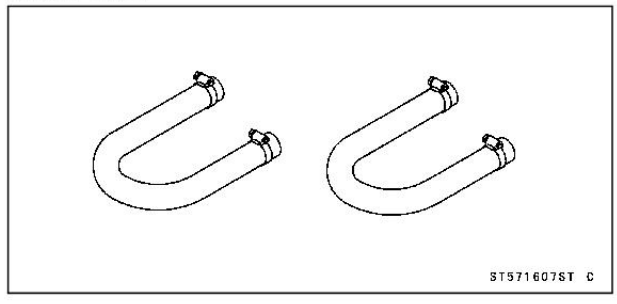

**Fuel Pressure Gauge Adapter:**
**57001-1593**



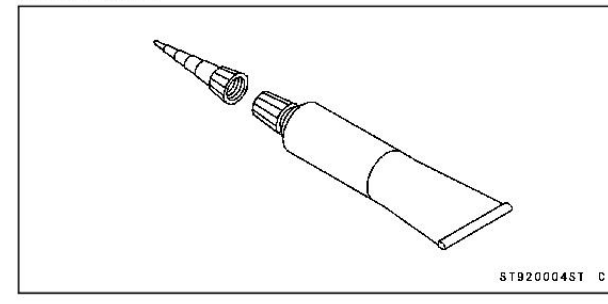

**Needle Adapter Set:**
**57001-1874**




**Fuel Hose:**
**57001-1607**




**Liquid Gasket, TB1211F:**
**92104-0004**



## DFI Servicing Precautions

### DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- ○When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- ○Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- ○Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- ○When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- ○When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- ○To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

- ○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Remove the fuel tank (see Fuel Tank Removal(3-38)) and check the fuel hose [A].
- ★Replace the fuel hose if any fraying, cracks or bulges are noticed.

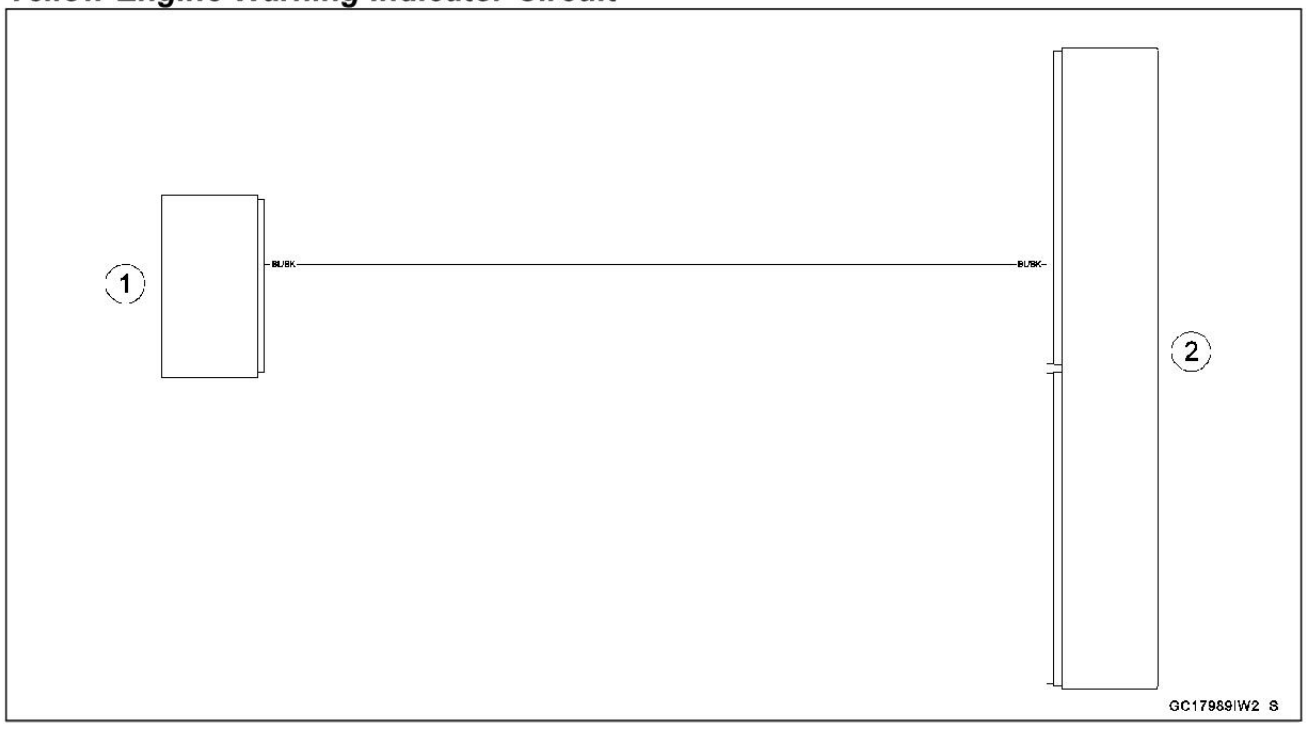
## Warning Indicator Light

### *Yellow Engine Warning Indicator Light Inspection*

○In this model, the yellow engine warning indicator light [A] goes on or blinks by the data sent from the ECU.

● Refer to the Meter Unit Inspection (see Meter Unit Inspection(16-67)).

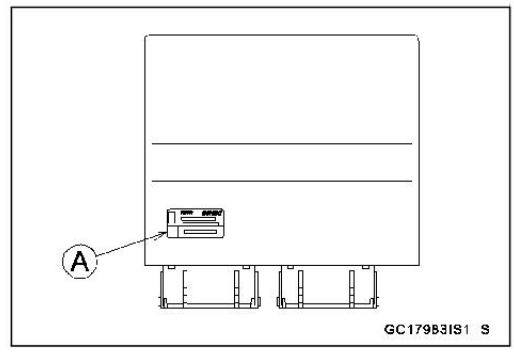
### *Yellow Engine Warning Indicator Circuit*




1. Meter Unit
2. ECU

## ECU

### *ECU Identification*




○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

**ECU Identification (ZX636J)**

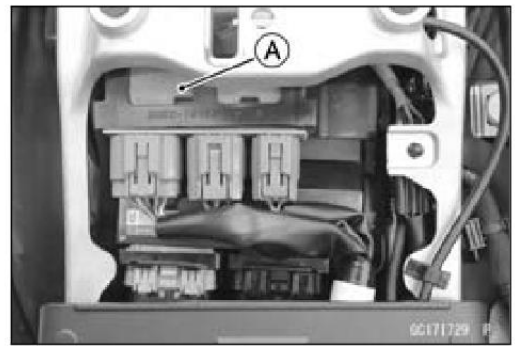
| Part Number [A] | Specification |
|---|---|
| 21175-1912 | WVTA (FULL), with Immobilizer |
| | SEA-B3, with Immobilizer |
| 21175-1918 | AU, with Immobilizer |
| | ID, with Immobilizer |
| 21175-1916 | US, without Immobilizer |
| | CA, without Immobilizer |
| 21175-1917 | CAL, without Immobilizer |
| 21175-1919 | TH, with Immobilizer |
| 21175-1920 | PH, with Immobilizer |
| 21175-1921 | SEA-B1, with Immobilizer |

**ECU Identification (ZX636K)**

| Part Number [A] | Specification |
|---|---|
| 21175-1925 | US, without Immobilizer |
| | CA, without Immobilizer |
| 21175-1926 | CAL, without Immobilizer |

### *ECU Removal*

| *NOTICE* |
|---|
| **Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.** |

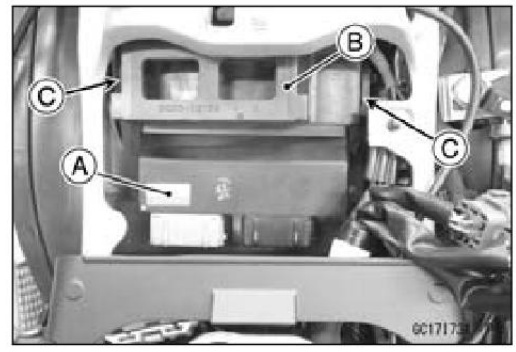



- Turn the ignition switch off.
- Remove the center seat cover (see Center Seat Cover Removal(15-22)).
- Remove the relay box [A] from the rubber protector.

- Disconnect the ECU connectors [A].

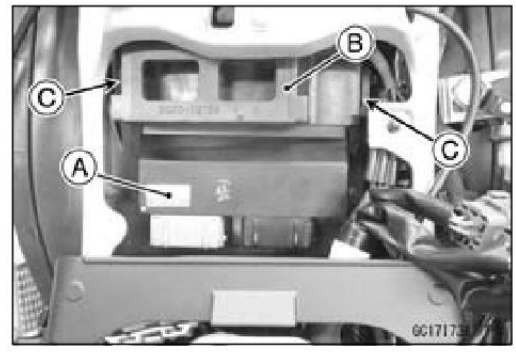
## ECU

● Remove:
ECU [A] (with Rubber Protector [B])
○Lift up the ECU with rubber protector to clear the projections [C].



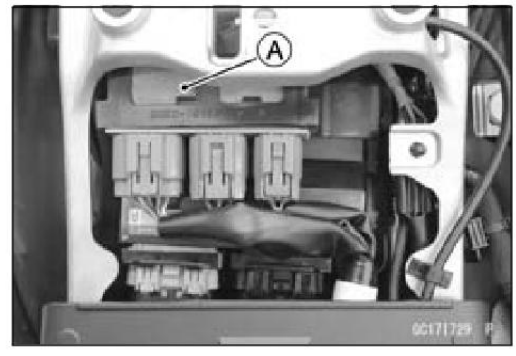

### *ECU Installation*

● Install:
ECU [A] (in Rubber Protector [B])
○Insert the slits of the rubber protector to the projections [C] of the rear fender.



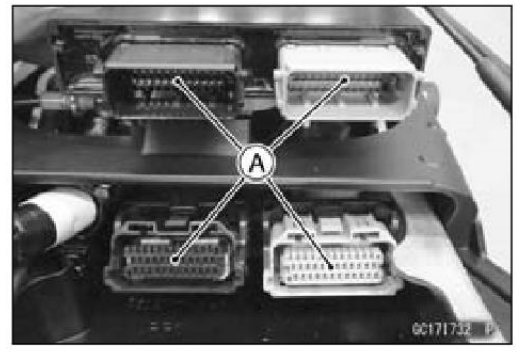

● Connect the ECU connectors [A].

● Install:
Relay Box [A]
● Install the removed parts.



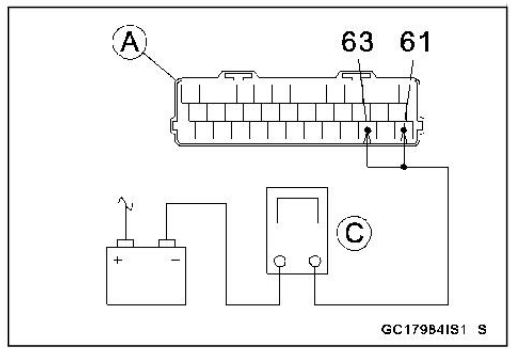

### *ECU Power Supply Inspection*

● Remove the center seat cover (see Center Seat Cover Removal(15-22)).
● Visually inspect the ECU connectors.
★If the connector is clogged with mud or dust, blow it off with compressed air.
● Remove the ECU (see ECU Removal(3-12)).
● Visually inspect the terminals [A] of the ECU and main harness connectors.
★If the terminals of the main harness connectors are damaged, replace the main harness.
★If the terminals of the ECU connectors are damaged, replace the ECU.



## ECU

- Check the ignition switch off.
- Disconnect the ECU connectors.
  Gray Connector [A]
  Black Connector [B]
- Connect a digital meter [C] and check the following wiring for continuity.

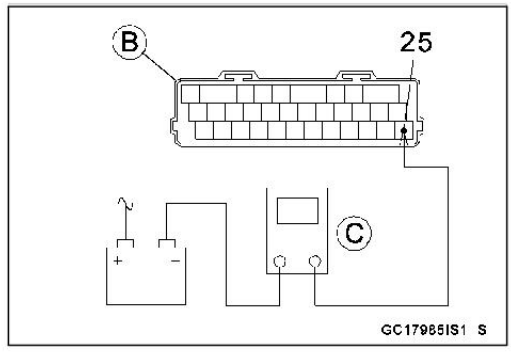



**ECU Grounding Inspection**
**Connections:**

| | | | |
|---|---|---|---|
| **(I)** | **ECU Terminal [A] 61 or 63** | ⟷ | **Battery (–) Terminal** |
| **(II)** | **ECU Terminal [B] 25** | ⟷ | **Battery (–) Terminal** |
| **(III)** | **Engine Ground** | ⟷ | **Battery (–) Terminal** |

**Criteria:**
**All: 0 Ω**

★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them if necessary.



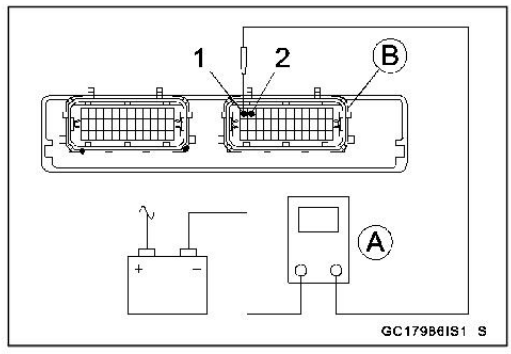

★If the wiring is good, check the power source voltage of the ECU.

**NOTE**

○*Be sure the battery is fully charged.*

- Connect the ECU connectors.
- Connect a digital meter [A] to the connector (black) [B] with the needle adapter set.

**Special Tool - Needle Adapter Set: 57001-1874**

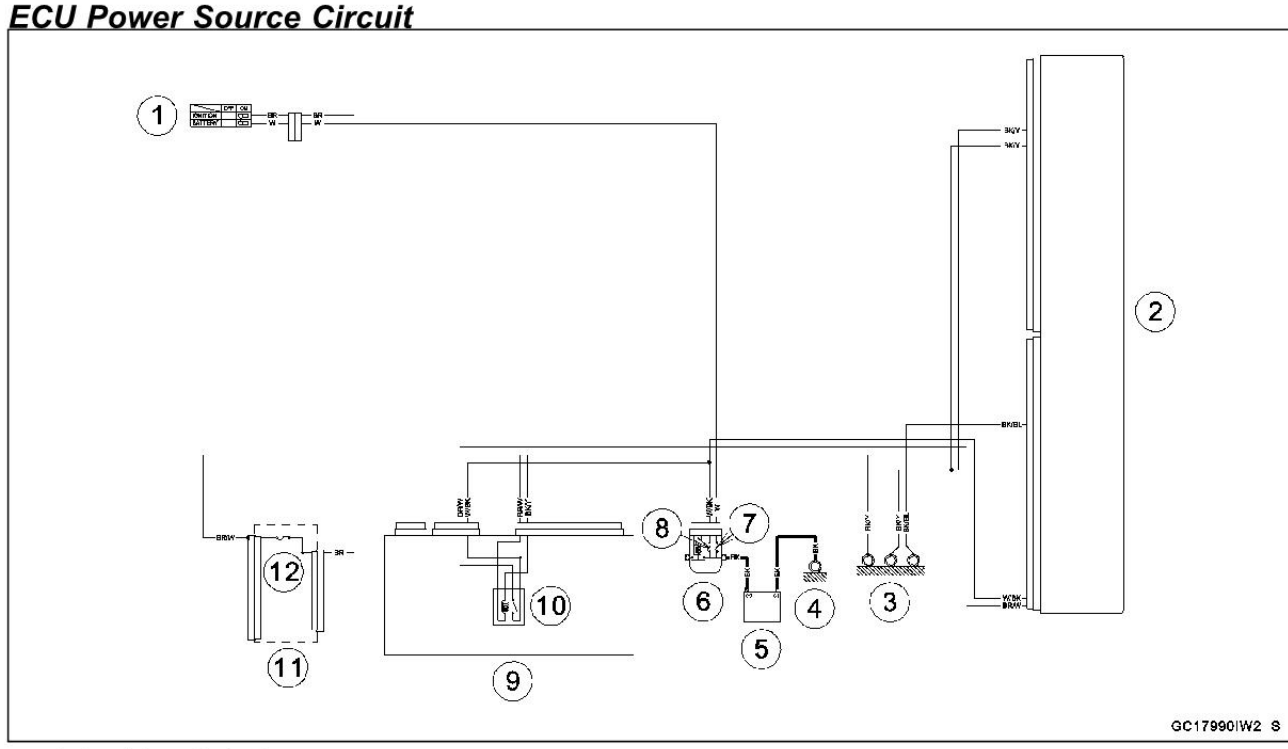



**ECU Power Supply Inspection**
**Connections:**
**(I) Digital Meter (+) → BR/W lead (terminal 1)**
**Digital Meter (–) → Battery (–) terminal**
**(II) Digital Meter (+) → W/BK lead (terminal 2)**
**Digital Meter (–) → Battery (–) terminal**
**Ignition Switch off:**
**BR/W lead (terminal 1): 0 V**
**W/BK lead (terminal 2): Battery Voltage**
**Ignition Switch on:**
**All: Battery Voltage**

★If the reading is out of the specification, check the following.
Main Fuse 30 A (see Fuse Inspection(16-106))
ECU Fuse 15 A (see Fuse Inspection(16-106))
ECU Main Relay (see Relay Circuit Inspection(16-101))
Power Source Wiring (see ECU Power Source Circuit(3-15))

## ECU

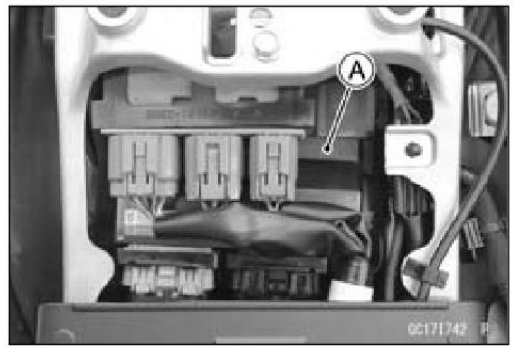
### *ECU Power Source Circuit*




1. Ignition Switch
2. ECU
3. Frame Grounds
4. Engine Ground
5. Battery
6. Starter Relay
7. Main Fuse 30 A
8. ECU Fuse 15 A
9. Relay Box
10. ECU Main Relay
11. Fuse Box (1)
12. Ignition Fuse 15 A

## CAN Communication Line

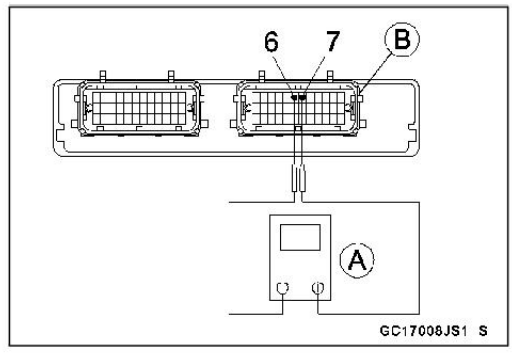
### *CAN Communication Line Resistance Inspection*




○In this model, resistors for CAN communication line are built in the ECU [A].

- Turn the ignition switch off.
- Remove:
  ECU (see ECU Removal(3-12))

- Connect a digital meter [A] to the ECU connector (black) [B].
- Measure the resistance of the CAN communication line resistor.




**CAN Communication Line Resistance (at ECU Terminals)**

**Connections: Terminal 6 ⟷ Terminal 7**

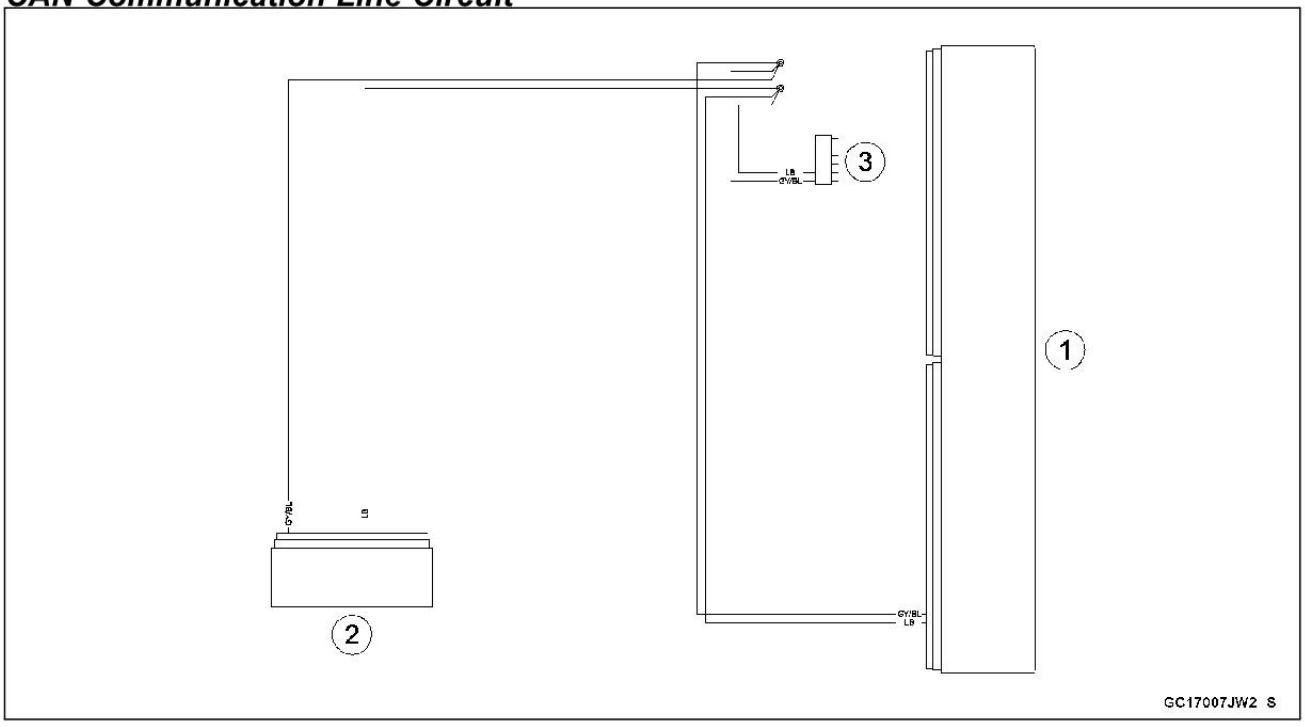
**Standard: About 120 Ω**

★If the reading is out of the range, replace the ECU.
★If the reading is within the range, resistor of the ECU for CAN communication line is normal.

- Check the wiring for continuity of the CAN communication line (see CAN Communication Line Circuit(3-16)).

★If the wiring is open, repair or replace the main harness.

### *CAN Communication Line Circuit*




1. ECU
2. ABS Hydraulic Unit (Equipped Models)
3. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector

## DFI Power Source

### *ECU Fuse Removal*

- Refer to the 30 A Main/15 A ECU Fuse Removal (see 30 A Main/15 A ECU Fuse Removal(16-105)).

### *ECU Fuse Installation*

★If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.

- Refer to the Fuse Installation (see Fuse Installation(16-106)).

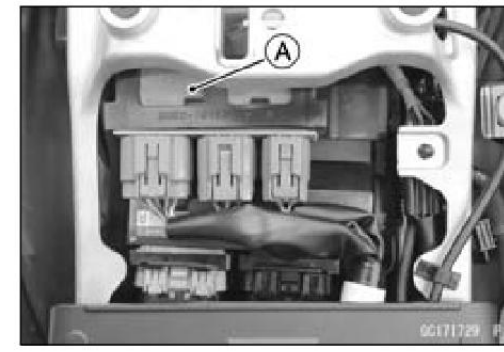
### *ECU Fuse Inspection*

- Refer to the Fuse Inspection (see Fuse Inspection(16-106)).

### *ECU Main Relay Removal*

○The ECU main relay is built in the relay box [A].

- Refer to the Relay Box Removal (see Relay Box Removal(16-101)).




### *ECU Main Relay Inspection*

- Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-101)).

## Fuel Line

### *Fuel Pressure Inspection*

**NOTE**

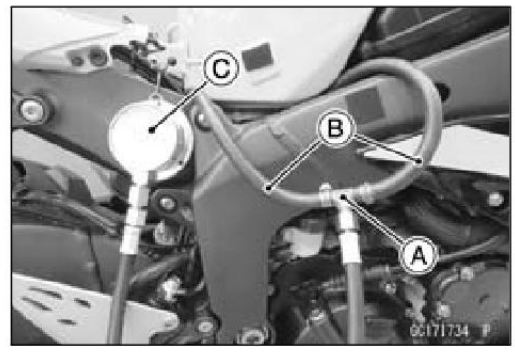
○*Be sure the battery is fully charged.*

● Remove:
Fuel Hose (see Fuel Hose Replacement(2-24))

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

**⚠ WARNING**

**Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.**




● Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel outlet pipe and delivery pipe.
● Secure the fuel hoses with the clamps.
● Connect the pressure gauge [C] to the fuel pressure gauge adapter.

**Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125**
**Fuel Pressure Gauge Adapter: 57001-1593**
**Fuel Hose: 57001-1607**

**⚠ WARNING**

**Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death. Do not try to start the engine with the fuel hoses disconnected.**

● Connect the fuel pump connector.
● Turn the engine stop switch run position.
● Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

**NOTE**

○*After turning on the engine stop switch and ignition switch, inspect the fuel leakage from the connected portion of the special tools.*

***NOTICE***

**Do not drive the fuel pump for 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.**

● Start the engine, and let it idle.
● Measure the fuel pressure with the engine idling.

**Fuel Pressure (with Engine Idling)**
**Standard: 294 kPa (3.0 kgf/cm², 43 psi)**

## Fuel Line

**NOTE**

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the ignition switch off.

★If the fuel pressure is much higher than specified, replace the fuel pump because the fuel pressure regulator in the fuel pump have been clogged or stuck.

★If the fuel pressure is much lower than specified, check the following.

Fuel Line Leakage (see Fuel System(2-21))

Amount of Fuel Flow (see Fuel Flow Rate Inspection(3-19))

- After above checks, measure the fuel pressure again.
- Remove the pressure gauge, hoses and fuel pressure gauge adapter.
- Install:

Fuel Hose (see Fuel Hose Replacement(2-24))

Fuel Tank (see Fuel Tank Installation(3-40))

- Start the engine and check for fuel leakage.

### *Fuel Flow Rate Inspection*

**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.**

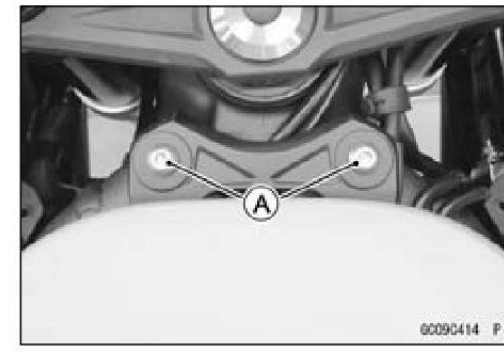
**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

**Special Tool - Fuel Hose: 57001-1607**

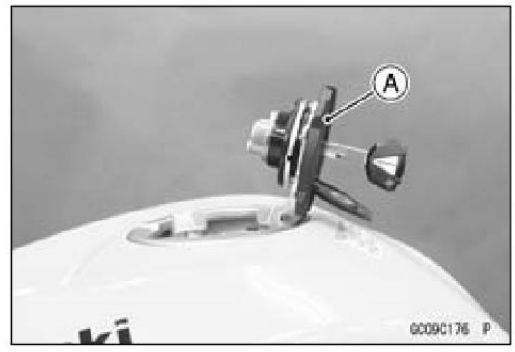
- Remove the fuel tank bolts [A].



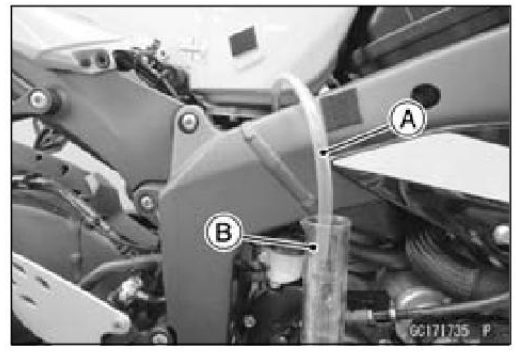
## Fuel Line

- Open the fuel tank cap [A] to lower the pressure in the tank.
- Remove the fuel hose from the fuel pump (see Fuel Tank Removal(3-38)).

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.




- Connect the prepared fuel hose [A] to the fuel outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].




**⚠ WARNING**

**Wipe off spilled out fuel immediately.**
**Be sure to hold the measuring cylinder vertical.**

- Close the fuel tank cap.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

***NOTICE***

**Do not drive the fuel pump for 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.**

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

**Amount of Fuel Flow**
**Standard: 50 mL (1.7 US oz.) or more for 3 seconds**

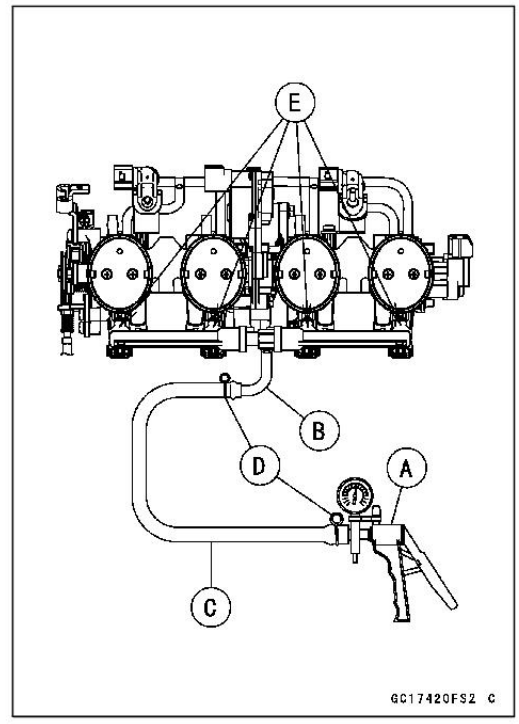
- Turn the ignition switch off.

★If the fuel flow is much less than the specified, replace the fuel pump.

- Install the fuel tank (see Fuel Tank Installation(3-40)).
- Start the engine and check for fuel leakage.

## Fuel Line

### *Fuel Line Leak Inspection*




● Remove:
Fuel Tank (see Fuel Tank Removal(3-38))
Fuel Hose (see Fuel Hose Replacement(2-24))

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

**⚠ WARNING**

**Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.**

● Check the fuel injector line for leakage as follows.

○Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with the fuel hose [C] (both ends with the clamps [D]) as shown.

○Apply soap and water solution to the areas [E] as shown.

○Watching the pressure gauge, squeeze the pump lever, and build up the pressure until the pressure reaches the maximum pressure.

**Injector Fuel Line Maximum Pressure**
**Standard: 300 kPa (3.06 kgf/cm², 43 psi)**

***NOTICE***

**During pressure testing, do not exceed the maximum pressure for which the system is designed.**

○Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the fuel line is good.

★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe assy, injectors and related parts.

○Repeat the leak test, and check the fuel line for no leakage.

● Install:
Fuel Hose (see Fuel Hose Replacement(2-24))
Fuel Tank (see Fuel Tank Removal(3-38))

● Start the engine and check for fuel leakage.

## Fuel Pump

### *Fuel Pump Removal*

**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.**

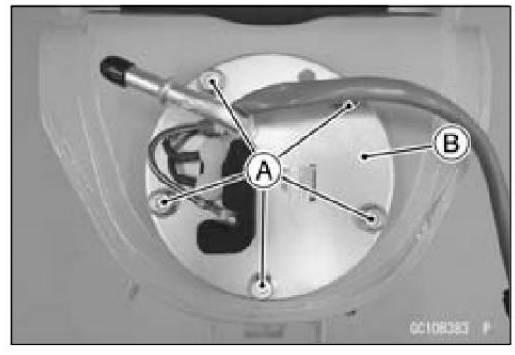
***NOTICE***

**Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.**

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal(3-38)).

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.

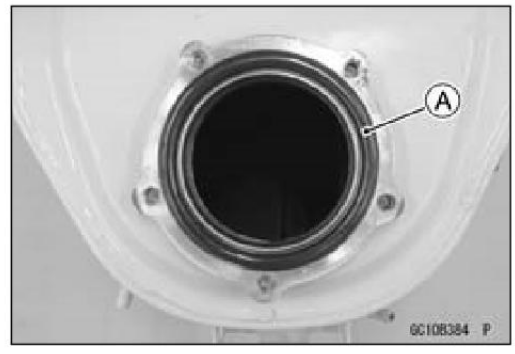
- Turn the fuel tank upside down.
- Remove:
  Fuel Pump Bolts [A]
  Fuel Pump [B]




***NOTICE***

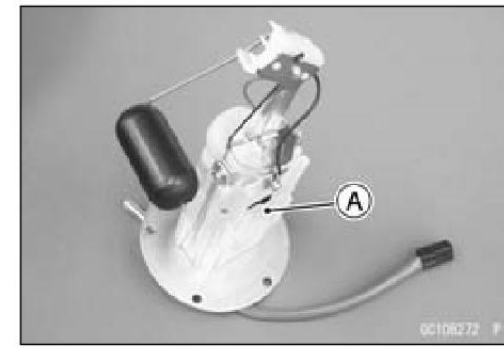
**Do not pull the leads of the fuel pump. If they are pulled, the lead terminals may be damaged.**

- Discard the fuel pump gasket [A].

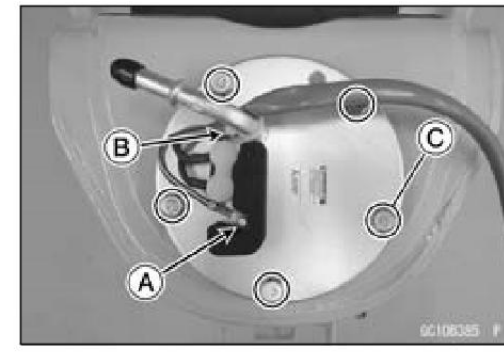


## Fuel Pump

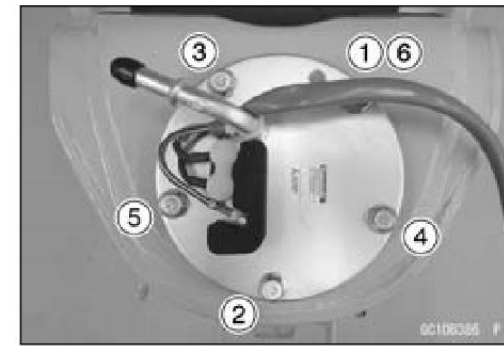
### *Fuel Pump Installation*




- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.
- Replace the fuel pump gasket with a new one.




- Check that the fuel pump terminal [A] and band [B] are in place.
- Replace the fuel pump bolts [C] with new ones.
- Tighten the fuel pump bolts to a snug fit.




- Tighten the fuel pump bolts following the specified tightening sequence [1 – 6].

  **Torque - Fuel Pump Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Tighten the fuel pump bolts again to check the tightness.

### *Fuel Pump Operation Inspection*

**NOTE**

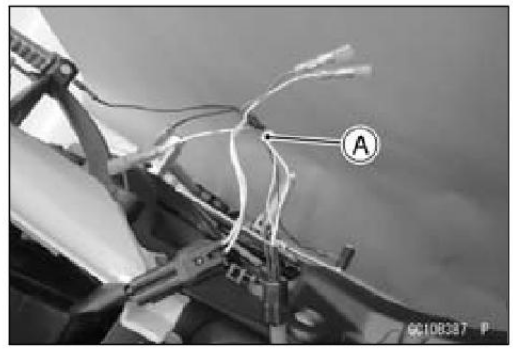
○*Be sure the battery is fully charged.*

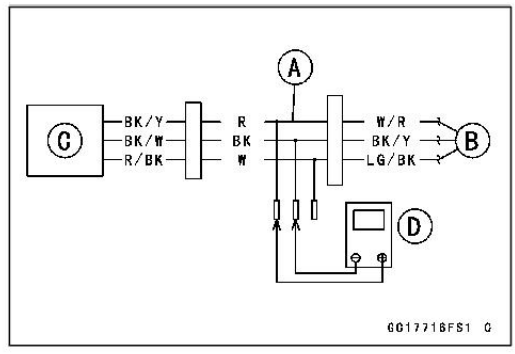
- Turn the engine stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.

★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection(3-24)).

## Fuel Pump

### *Fuel Pump Operating Voltage Inspection*




**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal(15-8)).
- Disconnect the fuel pump connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Pump [C]

**Special Tool - Measuring Adapter: 57001-1700**

- Connect a digital meter [D] to the measuring adapter leads.

**Fuel Pump Operating Voltage**
**Connections to Adapter:**
**Digital Meter (+) → R (pump BK/Y) lead**
**Digital Meter (–) → BK (pump BK/W) lead**

- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the engine stop switch run position.
- Turn the ignition switch on.

**Operating Voltage**
**Standard: Battery Voltage for 3 seconds, and then 0 V**

- Turn the ignition switch off.

★If the reading is in specification, but the pump does not operate, replace the fuel pump.

(When power is detected but out of specification.)

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection(16-101)).

★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection(3-13)).

★If the ground and power supply are good, replace the ECU.

(When power is not detected.)

★If there is no battery voltage, check the fuel pump relay (see Relay Circuit Inspection(16-101)).

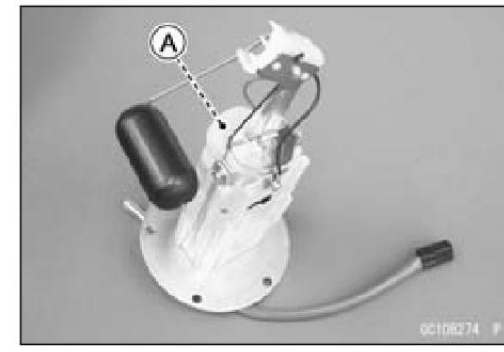
★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit(3-26)).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection(3-13)).

★If the ground and power supply are good, replace the ECU.

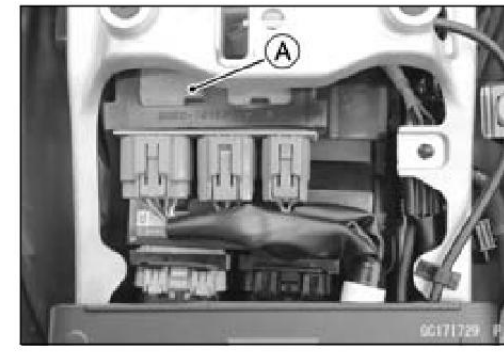
## Fuel Pump

### *Pressure Regulator Removal*




○The pressure regulator [A] is built into the fuel pump and can not be removed.

### *Fuel Pump Relay Removal*




○The fuel pump relay is built in the relay box [A].

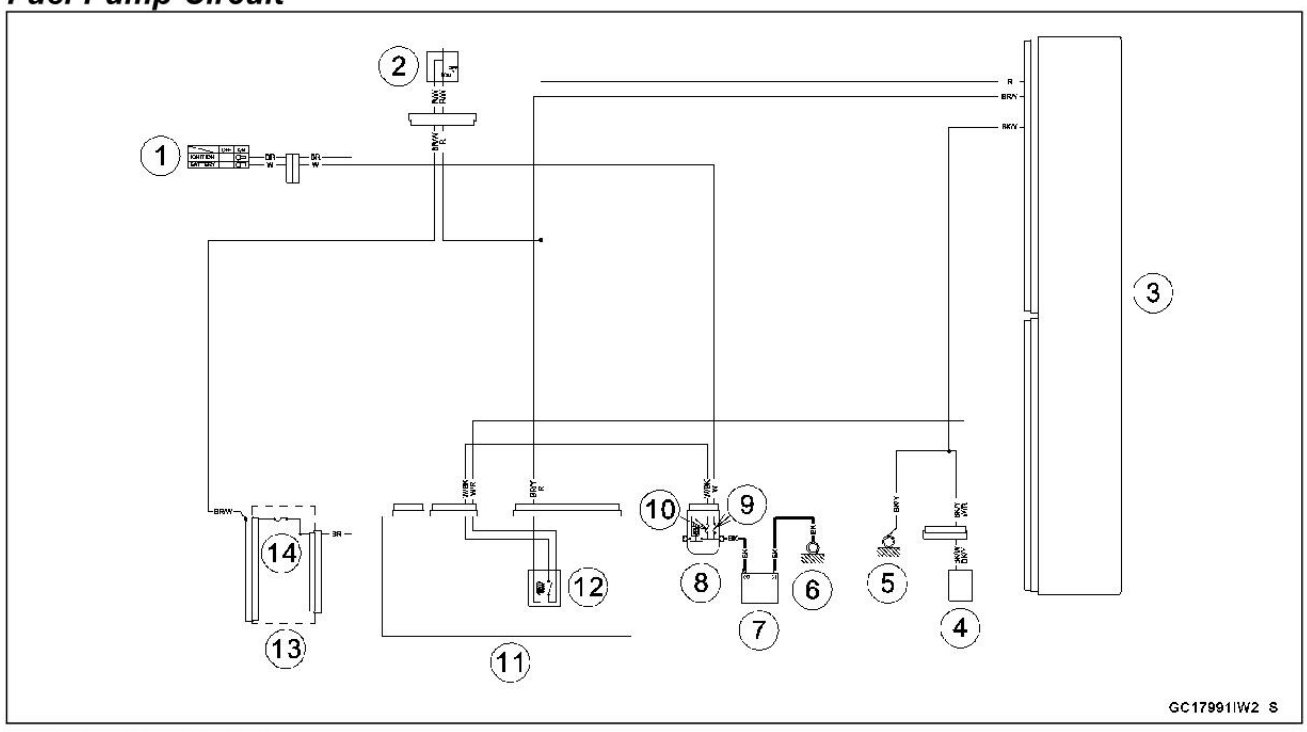
● Refer to the Relay Box Removal (see Relay Box Removal(16-101)).

### *Fuel Pump Relay Inspection*

● Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-101)).

## Fuel Pump

### *Fuel Pump Circuit*




1. Ignition Switch
2. Engine Stop Switch
3. ECU
4. Fuel Pump
5. Frame Ground
6. Engine Ground
7. Battery
8. Stater Relay
9. Main Fuse 30 A
10. ECU Fuse 15 A
11. Relay Box
12. Fuel Pump Relay
13. Fuse Box (1)
14. Ignition Fuse 15 A

## Throttle Grip and Cables

### *Throttle Grip Free Play Inspection*

- Refer to the Throttle Control System Inspection (see Throttle Control System Inspection(2-17)).

### *Throttle Grip Free Play Adjustment*

- Refer to the Throttle Control System Inspection (see Throttle Control System Inspection(2-17)).

### *Throttle Cable Installation*

- Install the throttle cables in accordance correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the lower ends of the throttle cables in the throttle pulley on the throttle body assy after installing the upper ends of the throttle cables in the grip.
- After installation, adjust each cable properly (see Throttle Control System Inspection(2-17)).

**⚠ WARNING**

**Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition. Be sure the cables are routed correctly and properly adjusted.**

### *Throttle Cable Lubrication*

- Refer to the Chassis Parts Lubrication (see Chassis Parts Lubrication (2-64)).

## Throttle Body Assy

### *Idle Speed Inspection*

- Refer to the Idle Speed Inspection (see Idle Speed Inspection(2-17)).

### *Idle Speed Adjustment*

- Refer to the Idle Speed Inspection (see Idle Speed Inspection(2-17)).

### *Synchronization Inspection*

- Refer to the Engine Vacuum Synchronization Inspection (see Engine Vacuum Synchronization Inspection(2-18)).

### *Throttle Body Assy Removal*

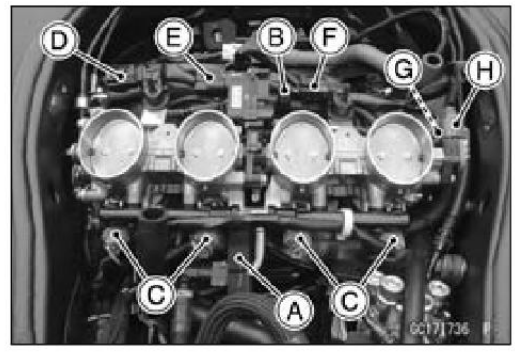
**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.**

***NOTICE***

**Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.**

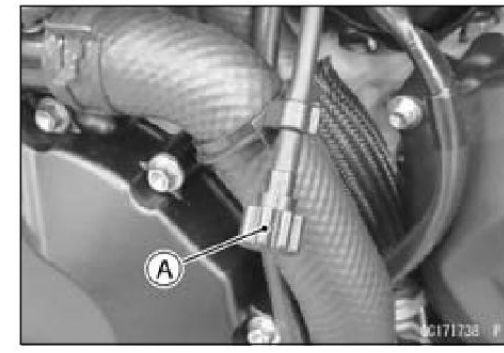
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
  Fuel Hose (see Fuel Hose Replacement(2-24))
  Pad [A]
  Band [B]
- Disconnect:
  Fuel Injector Connectors [C]
  Intake Air Pressure Sensor #1 Connector [D]
  Subthrottle Valve Actuator Connector [E]
  Intake Air Pressure Sensor #2 Connector [F]
  Main Throttle Sensor Connector [G]
  Subthrottle Sensor Connector [H]
- For other than US and CA models, remove the vacuum hose.



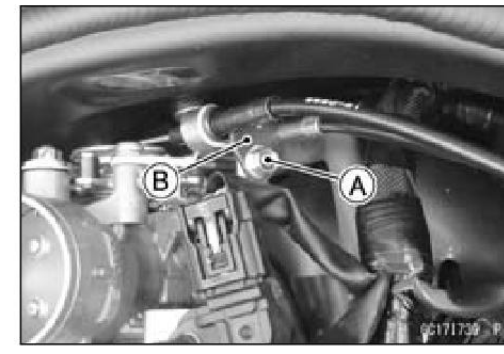
## Throttle Body Assy

- Loosen the throttle body assy holder clamp bolts [A].

- Disconnect the adjusting screw [A] from the clamp.




- Remove the throttle body assy from the throttle body assy holders.
- Remove:
  Bolt [A]
  Holding Plate [B]
  Throttle Cable Lower Ends
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders.

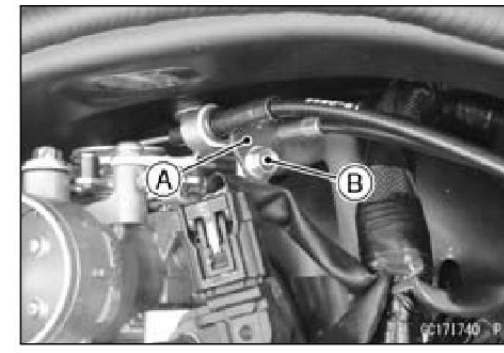



| *NOTICE* |
| --- |
| **If dirt gets into the engine, excessive engine wear and possible engine damage will occur.** |

### *Throttle Body Assy Installation*

- Apply a thin coat of grease to the throttle cable lower ends.
- Fit the accelerator cable end and the decelerator cable end into the throttle pulley.
- Install the holding plate [A] securely.
- Replace the throttle cable holding plate bolt [B], and tighten it.

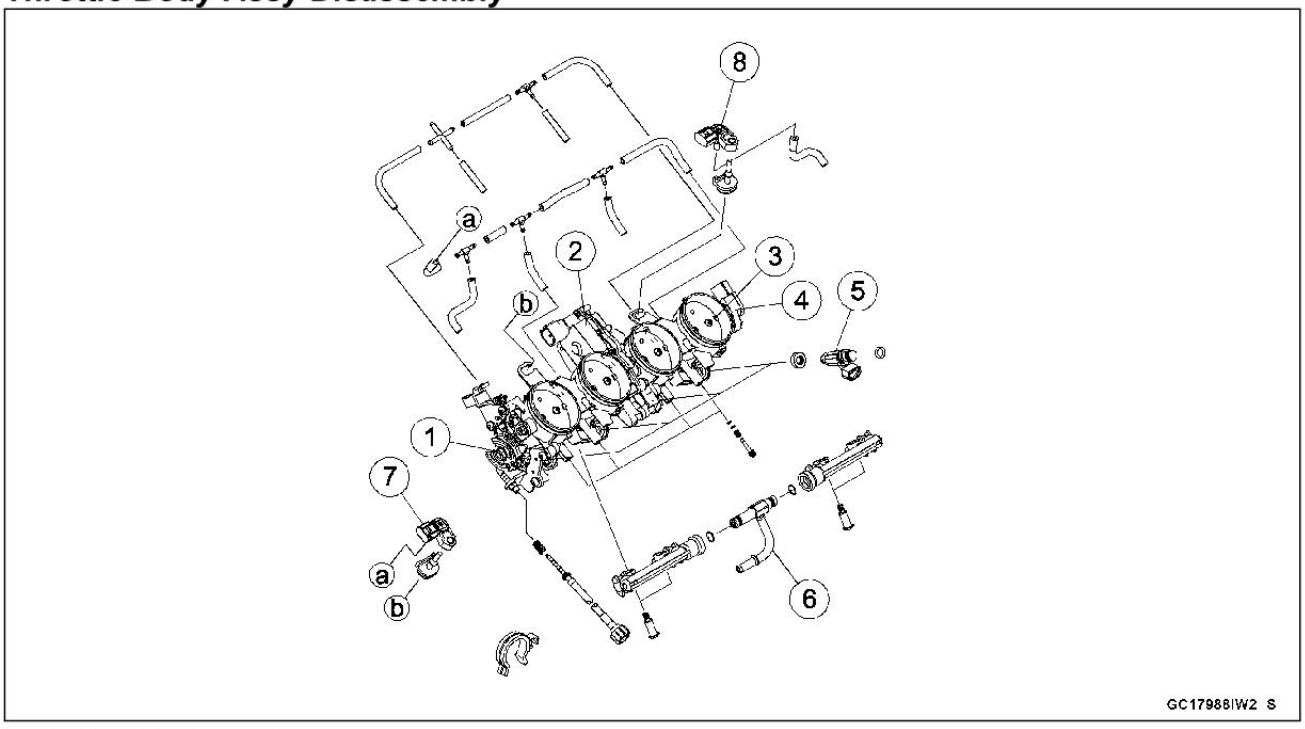
**Torque - Throttle Cable Holding Plate Bolt: 4.0 N·m (0.41 kgf·m, 35 in·lb)**




- Install the throttle body assy, and tighten the clamp bolts.
- Run the cables correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Turn the throttle grip and make sure that the throttle pulley moves smoothly and return by spring force.
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.
- Adjust:
  Throttle Grip Free Play (see Throttle Control System Inspection(2-17))
  Idle Speed (see Idle Speed Adjustment(2-17))

## Throttle Body Assy

### *Throttle Body Assy Disassembly*

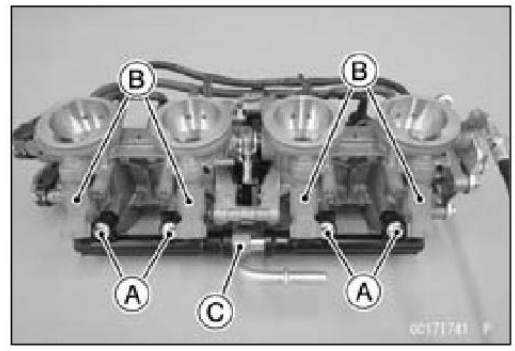



1. Throttle Body Assy
2. Subthrottle Valve Actuator
3. Main Throttle Sensor
4. Subthrottle Sensor
5. Fuel Injectors
6. Delivery Pipe Assy
7. Intake Air Pressure Sensor #1
8. Intake Air Pressure Sensor #2

***NOTICE***

**Do not remove, disassemble or adjust the main throttle sensor, subthrottle sensor, subthrottle valve actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.**

- Remove the throttle body assy (see Throttle Body Assy Removal(3-28)).
- Remove the screws [A] to pull out the fuel injectors [B] from the throttle body assy together with the delivery pipe assy [C].

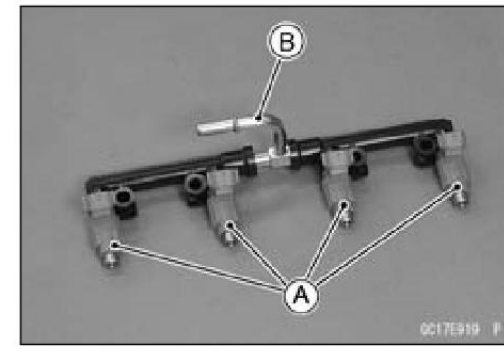



**NOTE**

○*Do not damage the insertion portions of the injectors when they are pulled out from the throttle body.*

## Throttle Body Assy

● Remove the fuel injectors [A] from the delivery pipe assy [B].




**NOTE**

○*Do not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.*

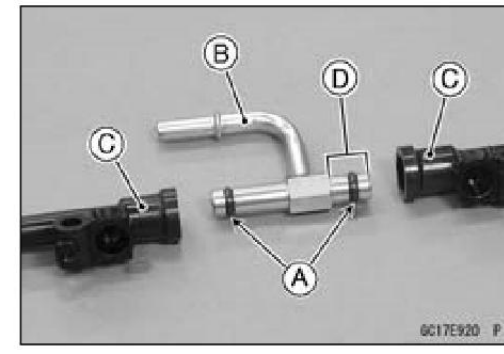
***NOTICE***

**Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.**

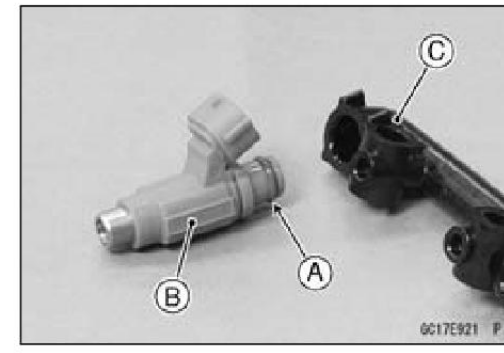
### *Throttle Body Assy Assembly*

● Before assembling, blow away dirt or dust from the throttle body and delivery pipe assy by applying compressed air.

● Replace the O-rings [A] of the joint pipe [B] with new ones.
● Apply engine oil to the new O-rings, and insert it to the delivery pipes [C].
○Insert the joint pipe so that the short side [D] faces right side.
○Left and right delivery pipes are identical.



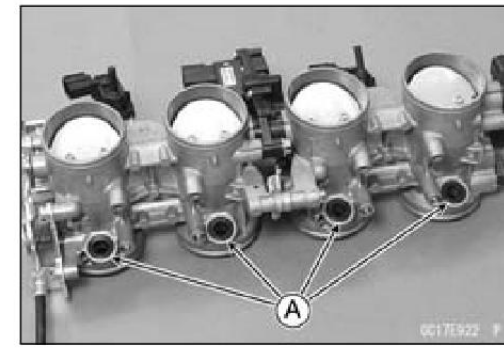

● Replace the O-rings [A] of each primary fuel injector [B] with new ones.
● Apply engine oil to the new O-rings, insert them to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.




● Replace the dust seals [A] with new ones.
● Apply engine oil to the new dust seals.
● Install the fuel injectors along with the delivery pipe assy to the throttle body.
● Tighten:

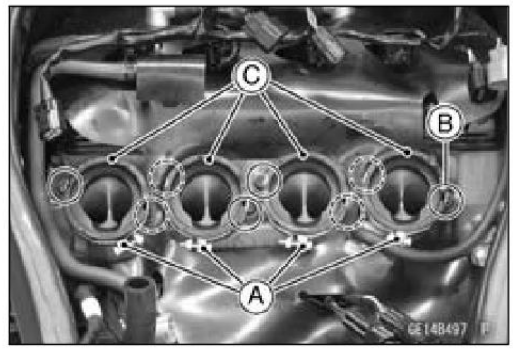
**Torque - Delivery Pipe Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)**

● Install the throttle body assy (see Throttle Body Assy Installation(3-29)).



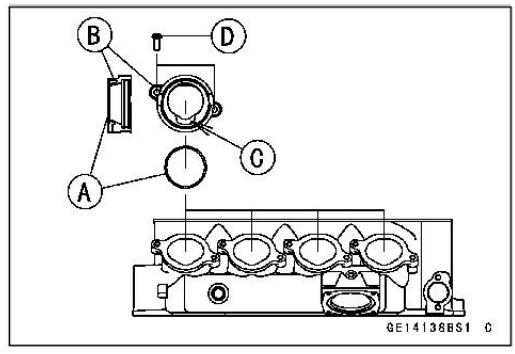
## Throttle Body Assy

### *Throttle Body Assy Holder Removal*




- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-28))
  Clamps [A]
  Throttle Body Assy Holder Bolts [B]
  Throttle Body Assy Holders [C]

### *Throttle Body Assy Holder Installation*

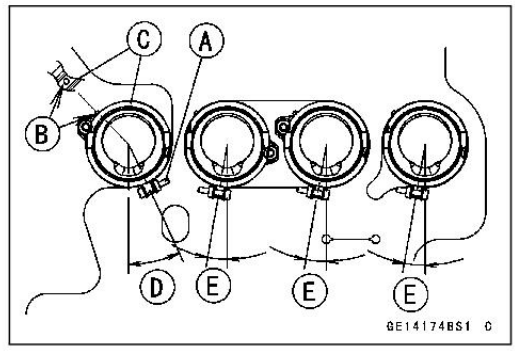



- Replace the O-rings [A] with new ones.
- Apply liquid gasket to any three positions of the O-rings to prevent it from coming off, and install them.

  **Sealant - Liquid Gasket, TB1211F: 92104-0004**

- Install the holders [B] as shown.
  Recession [C]
- Replace the throttle body assy holder bolts [D] with new ones, and tighten them.

  **Torque - Throttle Body Assy Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**




- Fit the hole of the clamp [A] to the projection [B] of the holder [C].
  25° [D]
  10° [E]
- Install:
  Throttle Body Assy (see Throttle Body Assy Installation(3-29))

## Air Cleaner

### *Air Cleaner Element Removal*

- Refer to the Air Cleaner Element Replacement (see Air Cleaner Element Replacement(2-16)).

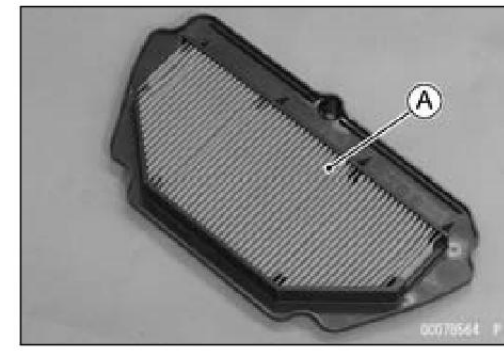
### *Air Cleaner Element Installation*

- Refer to the Air Cleaner Element Replacement (see Air Cleaner Element Replacement(2-16)).

### *Air Cleaner Element Inspection*

- Remove the air cleaner element (see Air Cleaner Element Replacement(2-16)).
- Visually check the element [A] for tears or breaks.

★If the element has any tears or breaks, replace the element.

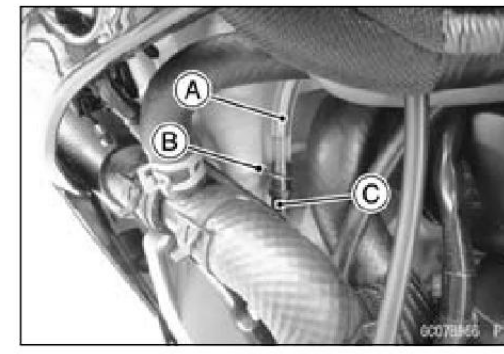



### *Air Cleaner Oil Draining*

A drain hose is connected to the bottom of the air cleaner to drain water or oil accumulated in the cleaner part.

- Visually check the drain hose [A], if the water or oil accumulates in the hose.

★If any water or oil accumulates in the drain hose, slide the clamp [B] and remove the plug [C] from the drain hose and drain it.

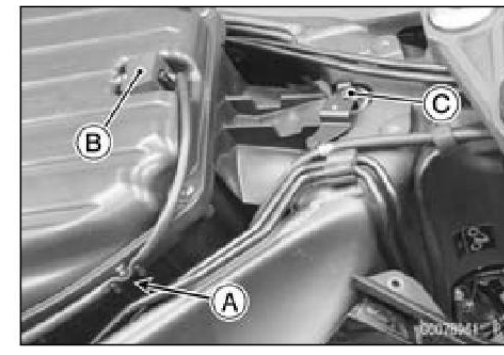



**⚠ WARNING**

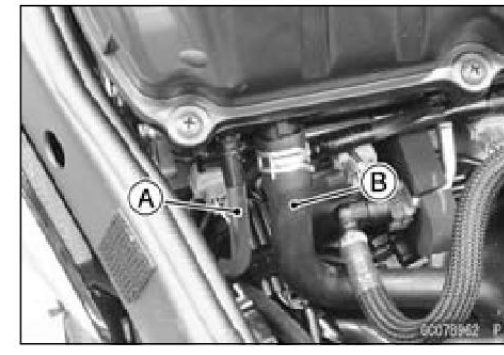
**Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the catch tank after draining.**

### *Air Cleaner Housing Removal*

- Remove the fuel tank (see Fuel Tank Removal(3-38)).
- Free the lead from the clamp [A].
- Disconnect the intake air temperature sensor connector [B].
- Remove the bolt [C].

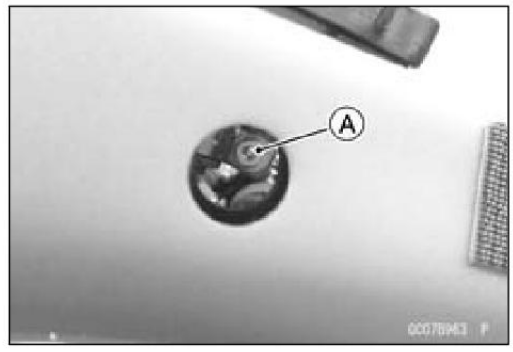



- Disconnect:
  Air Cleaner Drain Hose [A]
  Breather Hose [B]

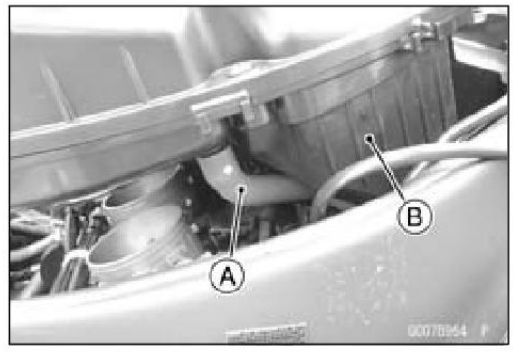


## Air Cleaner

- Loosen the air cleaner housing clamp bolt [A] on both sides.




- Disconnect the air switching valve hose [A] from the air cleaner housing [B].




### *Air Cleaner Housing Installation*

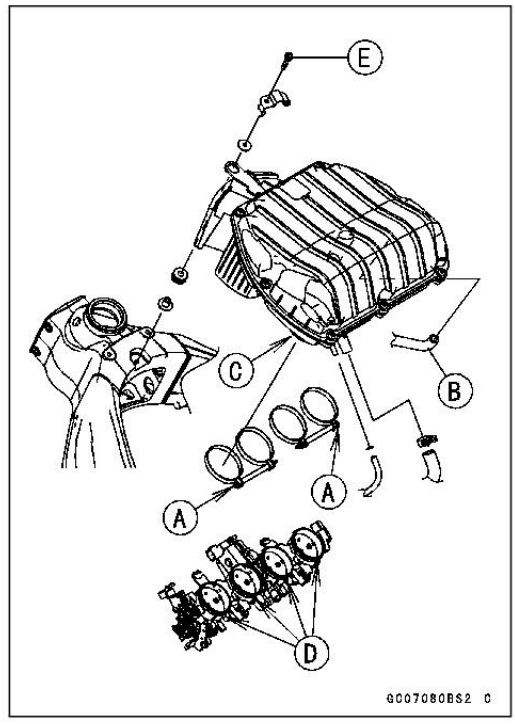
- Install the clamp bolt heads [A] outside as shown.
- Install the air switching valve hose to the air cleaner housing, so that white paint of the hose [B] is turned to the front side rib.
- Install the air cleaner housing on the throttle body assy.

○Push in the ducts [C] touch the stopper [D] of the throttle body.

- Tighten:

**Torque - Air Cleaner Housing Clamp Bolts: 1.5 N·m (0.15 kgf·m, 13 in·lb)**

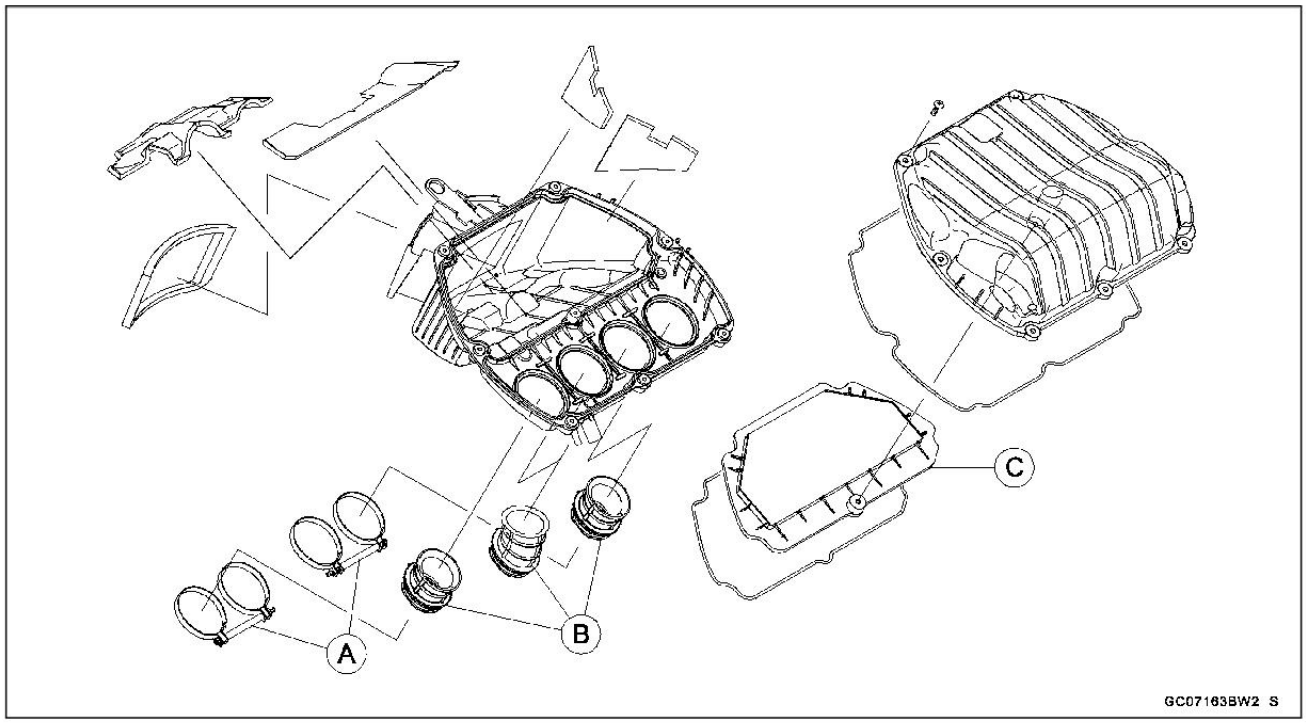
- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten the bolt [E] securely.
- Install the removed parts.



## Air Cleaner

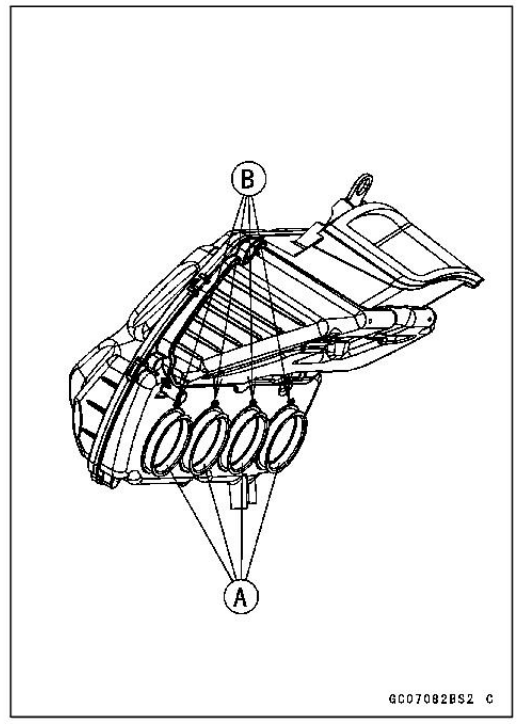
### *Air Cleaner Housing Disassembly*

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
Intake Air Temperature Sensor (see Intake Air Temperature Sensor Removal(17-66))
Clamps [A]
Ducts [B]
Air Cleaner Element [C] (see Air Cleaner Element Replacement(2-16))



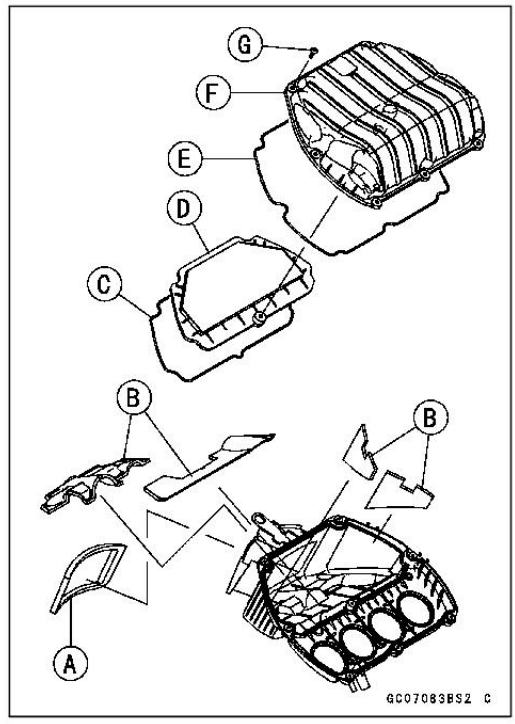

### *Air Cleaner Housing Assembly*

● Install the ducts [A] to the air cleaner housing.
○Fit the projections [B] of the duct into the slits on the air cleaner housing.
○Do not twist the ducts.



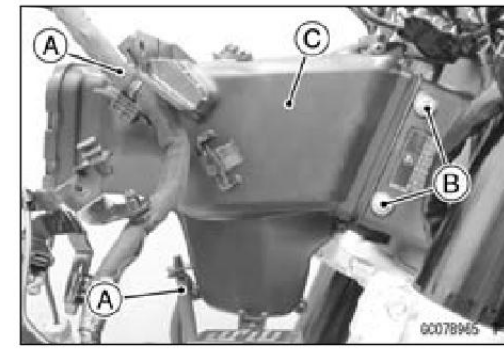
## Air Cleaner

- Install:
  Air Cleaner Frame Gasket [A]
  Pads [B]
  Air Cleaner Element Gasket [C]
  Air Cleaner Element [D]
  Air Cleaner Housing Gasket [E]
  Upper Air Cleaner Housing [F]
  Air Cleaner Housing Assembly Screws [G]
- Install the air cleaner housing (see Air Cleaner Housing Installation(3-34)).



## Air Line

### *Air Intake Duct Removal*




- Remove:
  Upper Fairing (see Upper Fairing Removal(15-15))
  Meter Bracket (see Meter Unit Removal(16-62))
- Free the leads [A].
- Remove:
  Air Intake Duct Bolts [B] (Both Sides)
  Air Intake Duct [C]

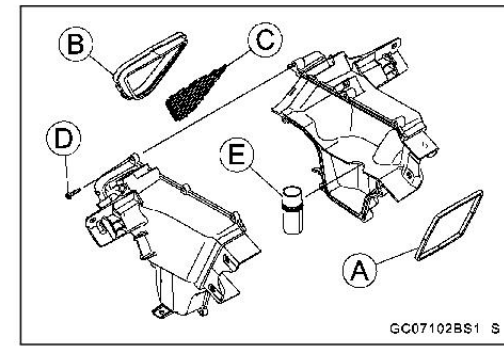
### *Air Intake Duct Installation*

- Check that the pad [A] is in place on the air intake duct.
- Replace the air intake duct bolts, and tighten them.

  **Torque - Air Intake Duct Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

### *Air Intake Duct Disassembly*




- Remove:
  Air Intake Duct (see Air Intake Duct Removal(3-37))
  Pad [A]
  Seal [B] and Screen [C]
  Air Intake Duct Assembly Screws [D]
  Pipe [E]

### *Air Intake Duct Assembly*

- Assembly is the reverse of disassembly.
- Tighten:

  **Torque - Air Intake Duct Assembly Screws: 3.0 N·m (0.31 kgf·m, 27 in·lb)**

- Install the pad so that the open side [A] faces downward.

## Fuel Tank

### *Fuel Tank Removal*

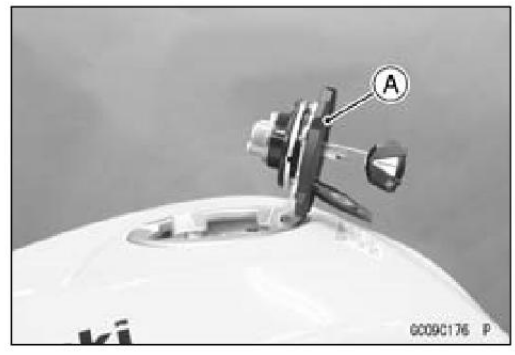
**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.**

- Turn the ignition switch off.
- Wait until the engine cools down.
- Remove:
  Front Seat (see Front Seat Removal(15-8))
  Side Cover (see Side Cover Removal(15-19))

- Open the fuel tank cap [A] to lower the pressure in the tank.

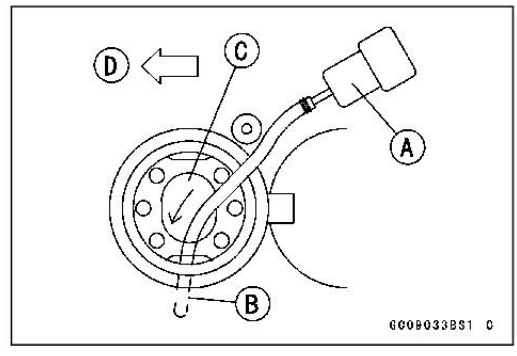
○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.




- Draw the fuel out from the fuel tank with a commercially available pump [A].

○Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.

○Put the hose through the fill opening [C] into the tank and draw the fuel out.
  Front [D]

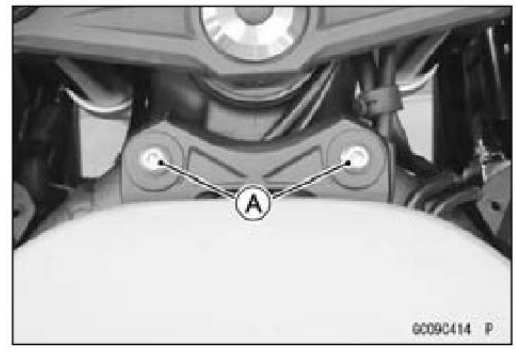



**⚠ WARNING**

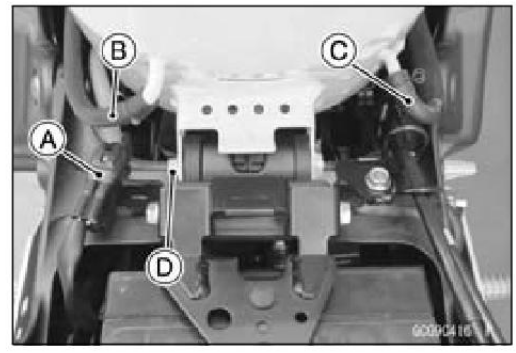
**Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.**

## Fuel Tank

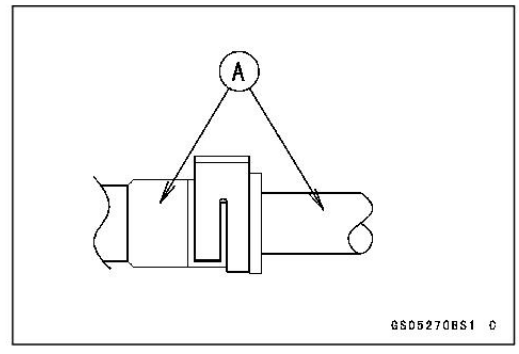
- Remove:
  Fuel Tank Bolts [A]




- Remove the fuel pump connector [A] from the bracket.
- Disconnect:
  Battery (–) Terminal
  Fuel Pump Connector
  Fuel Tank Drain Hose [B]
  Fuel Tank Breather Hose [C]
- Remove:
  Fuel Tank Bolt [D]




- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.




**When removing with flat tip screwdriver**

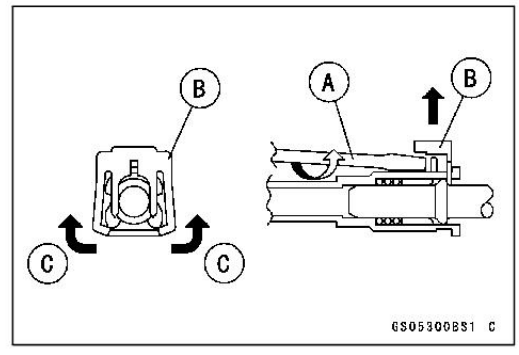
- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

**When removing with fingers**

- Open and push up [C] the joint lock with your fingers.

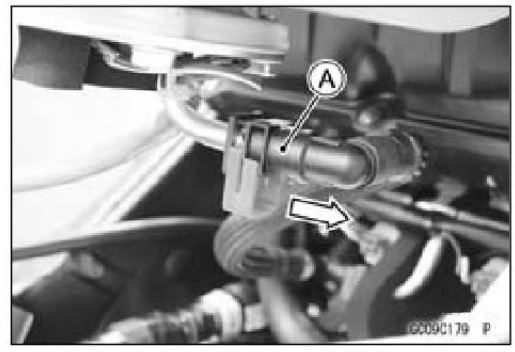
***NOTICE***

**Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.**



## Fuel Tank

● Pull the fuel hose joint [A] out of the outlet pipe.

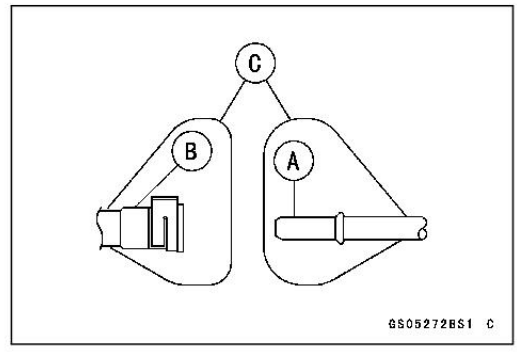



**⚠ WARNING**

**Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.**

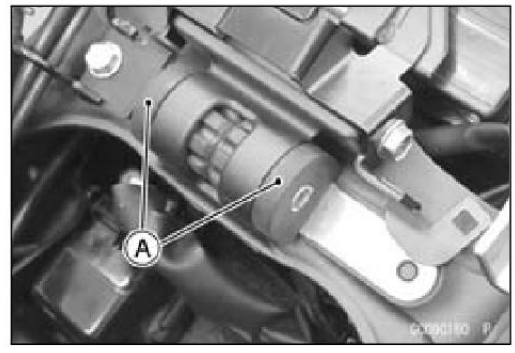
● Close the fuel tank cap.
● Remove the fuel tank, and place a it on flat surface.
○Do not apply the load to the fuel outlet pipe of the fuel pump.

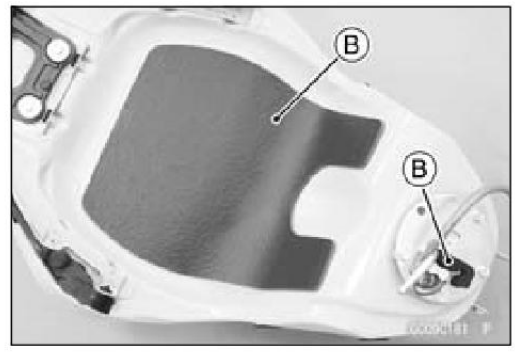
● Clean the pipe [A].
● Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.




### *Fuel Tank Installation*

● Note the above WARNING (see Fuel Tank Removal(3-38)).
● Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
● Check that the dampers [A] and pad [B] are in place on the frame and the fuel tank.
★If the dampers and pad are damaged or deteriorated, replace them.



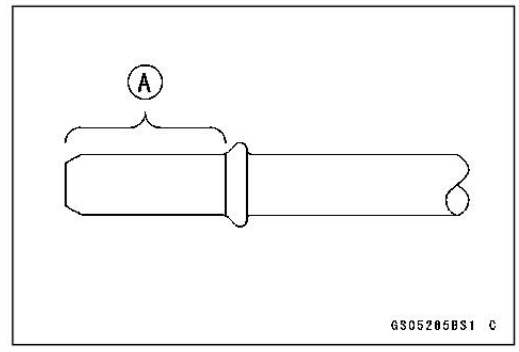



## Fuel Tank

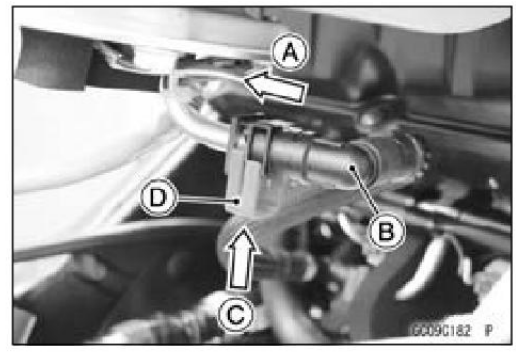
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.

★If the joint lock is deformed, replace the fuel hose with a new one.

- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].
- Apply engine oil to the pipe.



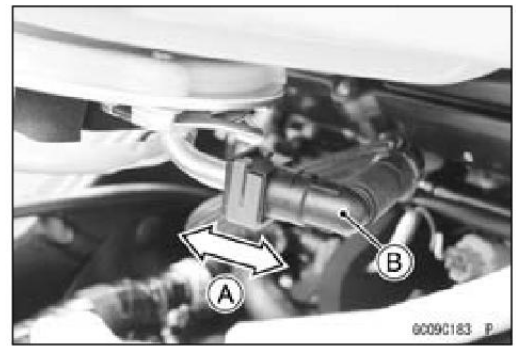

- Insert [A] the fuel hose joint [B] straight onto the fuel outlet pipe until the hose joint clicks.
- Push [C] the joint lock [D] until the hose joint clicks.




- Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked and does not come off.

**⚠ WARNING**

**Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.**




★If it comes off, reinstall the hose joint.

- Connect the fuel pump connector and the battery (–) terminal (see Battery Installation(16-24)).
- Install removed parts.

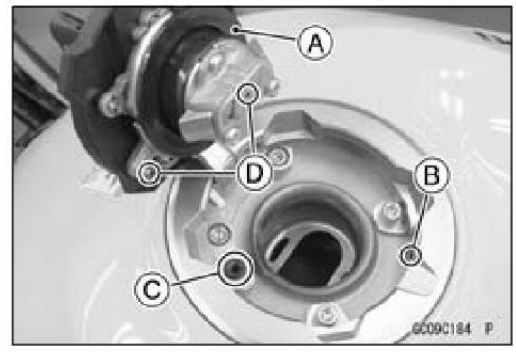
### *Fuel Tank and Cap Inspection*

- Open the fuel tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the gasket if it is damaged.

- Check to see if the water drain pipe [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.




***NOTICE***

**Do not apply compressed air to the air vent holes [D] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.**

## Fuel Tank

### *Fuel Tank Cleaning*

**⚠ WARNING**

**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.**

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Fuel Pump (see Fuel Pump Removal(3-22))
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation(3-23))
  Fuel Tank (see Fuel Tank Installation(3-40))

## Evaporative Emission Control System (Other than US and CA Models)

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

### *Parts Removal/Installation*

**⚠ WARNING**

**Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch off. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.**

***NOTICE***

**If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.**

- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)). Make sure they do not get pinched or kinked.

### *Hose Inspection*

- Refer to the Evaporative Emission Control System Inspection (Other than US and CA Models) (see Evaporative Emission Control System Inspection (Other than US and CA Models)(2-26)).

### *Purge Valve Inspection*

- Refer to the Purge Valve Inspection (see DTC P0443(17-103)) (see DTC P0459(17-104)).

### *Canister Inspection*

- Refer to the Evaporative Emission Control System Inspection (Other than US and CA Models) (see Evaporative Emission Control System Inspection (Other than US and CA Models)(2-26)).

# Cooling System

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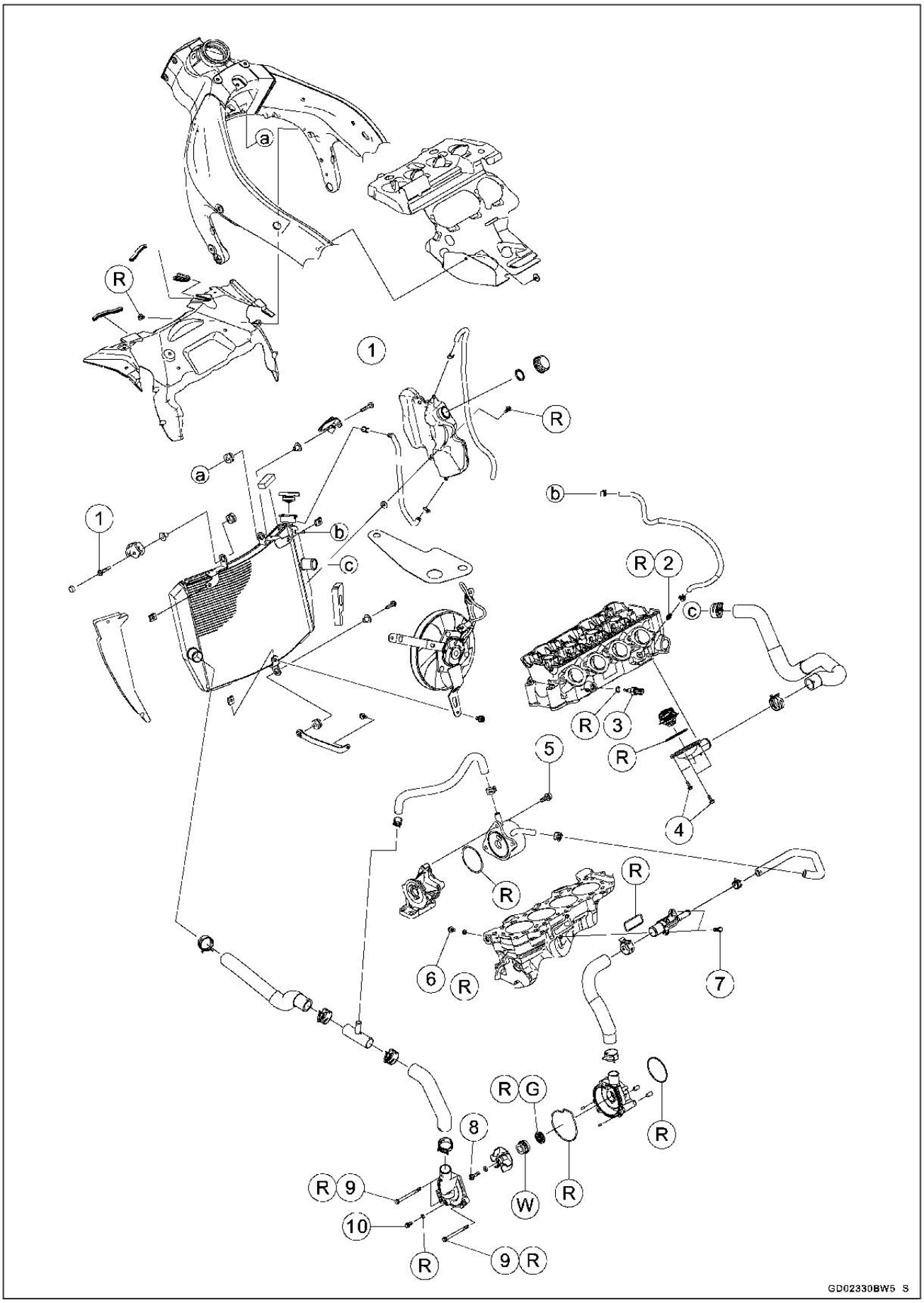
## Exploded View

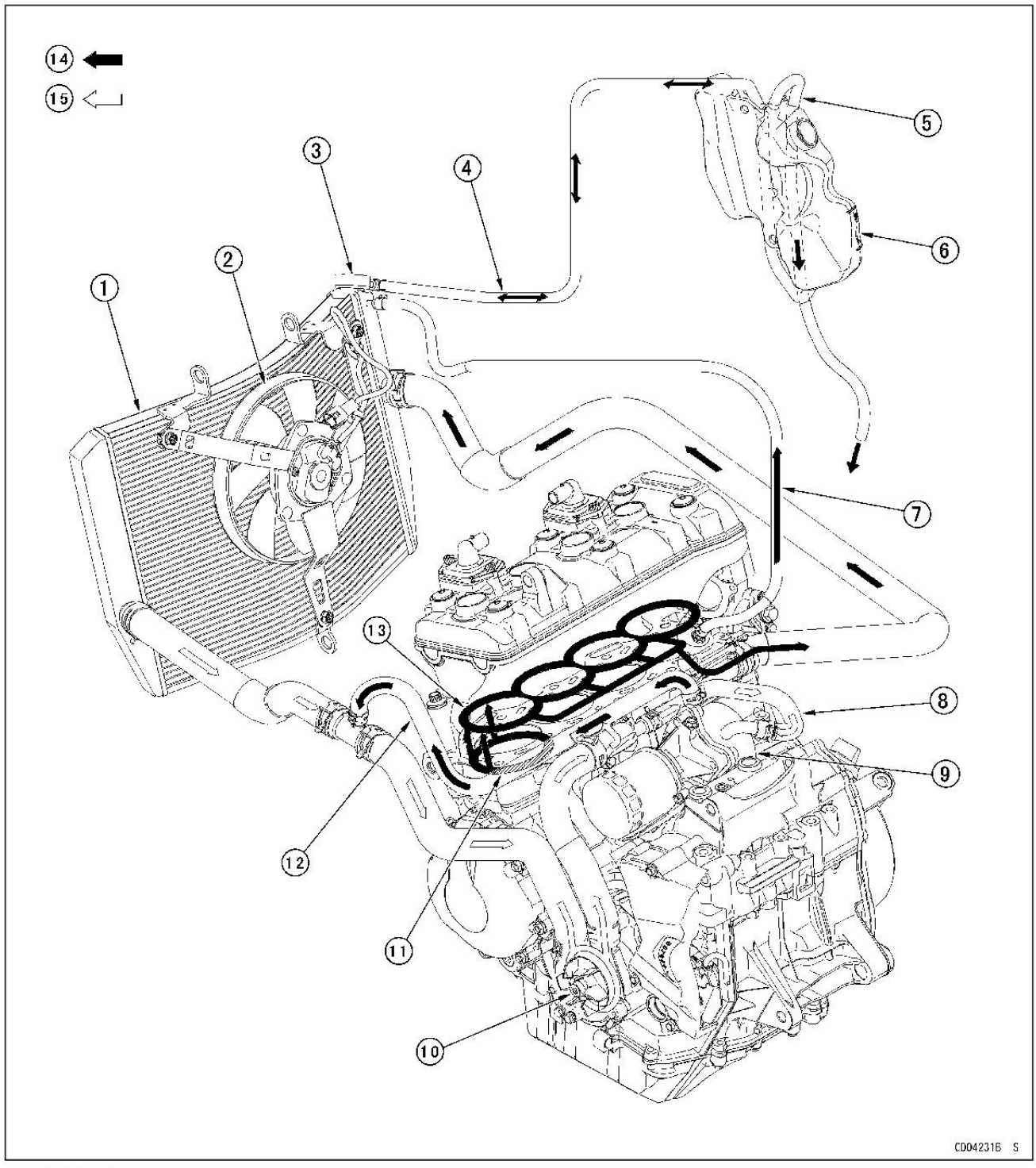


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Radiator Bolts (Upper) | 10 | 1.0 | 89 in·lb | |
| 2 | Water Hose Fitting | 9.0 | 0.92 | 80 in·lb | R |
| 3 | Water Temperature Sensor | 12 | 1.2 | 106 in·lb | |
| 4 | Thermostat Cover Bolts | 6.0 | 0.61 | 53 in·lb | |
| 5 | Oil Cooler Bolts | 20 | 2.0 | 15 | |
| 6 | Coolant Drain Bolt (Cylinder) | 10 | 1.0 | 89 in·lb | |
| 7 | Water Hose Fitting Bolts | 10 | 1.0 | 89 in·lb | |
| 8 | Water Pump Impeller Bolt | 10 | 1.0 | 89 in·lb | |
| 9 | Water Pump Cover Bolts | 12 | 1.2 | 106 in·lb | R |
| 10 | Coolant Drain Bolt (Water Pump) | 9.0 | 0.92 | 80 in·lb | |

G: Apply grease.
R: Replacement Parts
W: Apply water.

## Coolant Flow Chart




1. Radiator
2. Radiator Fan
3. Radiator Cap
4. Radiator Overflow Hose
5. Reserve Tank Overflow Hose
6. Reserve Tank
7. Air Bleeder Hose
8. Oil Cooler Intake Hose
9. Oil Cooler
10. Water Pump
11. Cylinder Jacket
12. Oil Cooler Outlet Hose
13. Cylinder Head Jacket
14. Hot Coolant
15. Cold Coolant

## Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 55°C (131°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 – 62°C (136 – 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 97.5°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

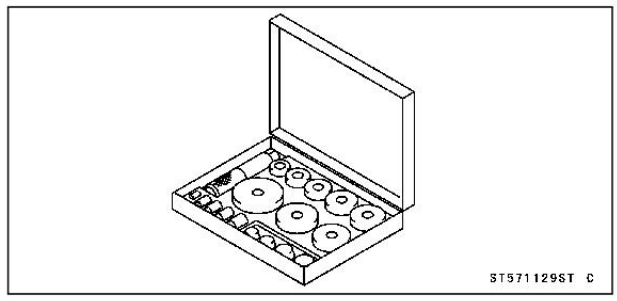
The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

## Specifications

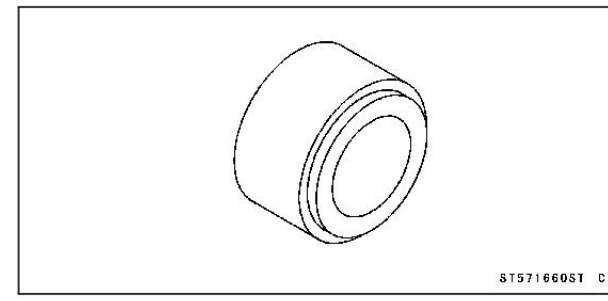
| Item | Standard |
|---|---|
| **Coolant Provided when Shipping** | |
| Type (Recommended) | Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) |
| Color | Green |
| Mixed Ratio | Soft water 50%, coolant 50% |
| Freezing Point | –35°C (–31°F) |
| Total Amount | 2.4 L (2.5 US qt) (Reserve tank full level, including radiator and engine) |
| **Radiator Cap** | |
| Relief Pressure | 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi) |
| **Thermostat** | |
| Valve Opening Temperature | 58 – 62°C (136 – 144°F) |
| Valve Full Opening Lift | 8 mm (0.31 in.) or more @75°C (167°F) |

## Special Tools

**Bearing Driver Set:**
**57001-1129**




**Oil Seal Driver $\phi$37.5:**
**57001-1660**



## Coolant

### *Coolant Deterioration Inspection*

- Remove the right middle inner fairing (see Middle Inner Fairing Removal(15-12)).
- Visually inspect the coolant in the reserve tank [A].

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

### *Coolant Level Inspection*

- Refer to the Coolant Level Inspection (see Coolant Level Inspection(2-27)).

### *Coolant Draining*

- Refer to the Coolant Change (see Coolant Change(2-27)).

### *Coolant Filling*

- Refer to the Coolant Change (see Coolant Change(2-27)).

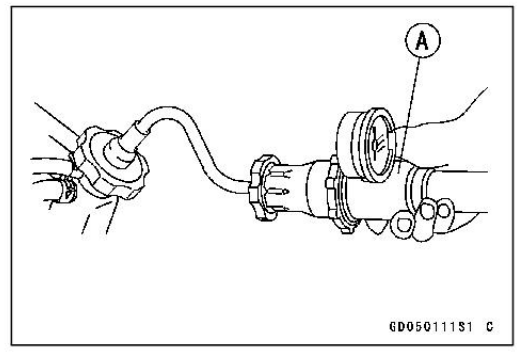
### *Pressure Testing*

- Remove:
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Radiator Cap [A]

- Install the cooling system pressure tester [A] on the filler neck.

**NOTE**

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*




- Build up pressure in the system carefully until the pressure reaches 137.3 kPa (1.40 kgf/cm², 19.9 psi).

***NOTICE***

**During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137.3 kPa (1.40 kgf/cm², 19.9 psi).**

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is all right.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the removed parts.

## Coolant

### *Cooling System Flushing*

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerable reduce the efficiency of the cooling system.

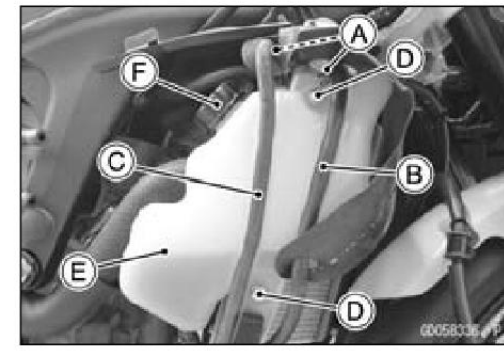
- Drain the cooling system (see Coolant Change(2-27)).
- Fill the cooling system with fresh water mixed with a flushing compound.

| *NOTICE* |
| --- |
| **Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.** |

- Warm up the engine, and run it at normal operating temperature for about 10 minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change(2-27)).

### *Coolant Reserve Tank Removal*

- Remove:
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
- Slide the clamps [A].
- Disconnect:
  Radiator Overflow Hose [B]
  Reserve Tank Overflow Hose [C]
- Remove:
  Coolant Reserve Tank Bolts [D]
  Collars
  Coolant Reserve Tank [E]
- Remove the cap [F] and pour the coolant into a container.




### *Coolant Reserve Tank Installation*

- Installation is the reverse of removal.
- Replace the coolant reserve tank bolts with new ones, and tighten them.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Fill the coolant reserve tank with coolant (see Coolant Change(2-27)).

## Water Pump

### *Water Pump Removal*

- Refer to the Oil Pump Removal (see Oil Pump Removal(7-14)).

### *Water Pump Installation*

- Refer to the Oil Pump Installation (see Oil Pump Installation(7-15)).

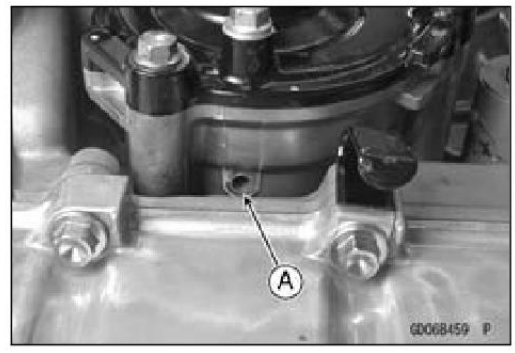
### *Water Pump Inspection*

- Remove the left lower fairing (see Lower Fairing Removal(15-9)).
- Check the drainage outlet passage [A] at the bottom of the water pump body for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.

○When coolant does not continuously leak, it is normal.

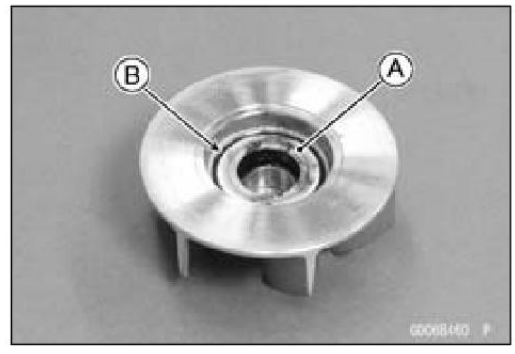
★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.

★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.




### *Water Pump Impeller Disassembly/Assembly*

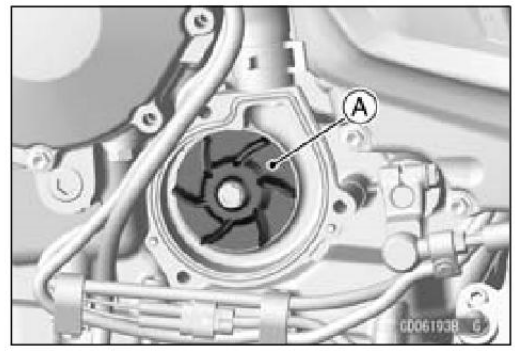
- Remove the water pump impeller (see Oil Pump Removal(7-14)).
- The sealing seat [A] and rubber seal [B] may be removed easily by hand.
- Apply water to the surfaces of the sealing seat.
- Replace the rubber seal with a new one.
- Apply grease to the inside of the rubber seal.
- Install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.
- Install the water pump impeller (see Oil Pump Installation(7-15)).




### *Water Pump Impeller Inspection*

- Remove the water pump cover (see Oil Pump Removal(7-14)).
- Visually inspect the impeller [A].

★If the surface is corroded or if the blades are damaged, replace the impeller.

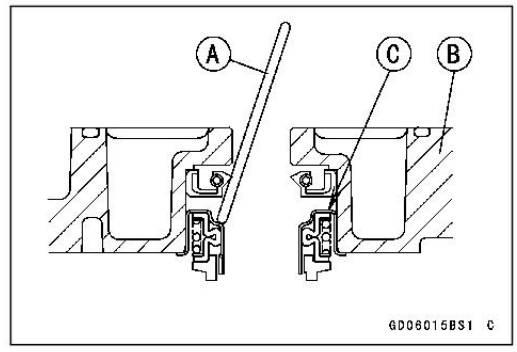


## Water Pump

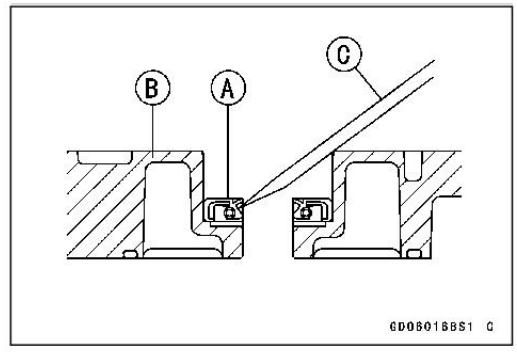
### *Water Pump Housing Disassembly*

| NOTICE |
| --- |
| **Do not damage the hole wall of the water pump housing.** |

- Insert a bar [A] into the pump housing [B], and hammer evenly around the circumference of the mechanical seal bottom [C].




- Take the oil seal [A] out of the housing [B] with a hook [C].

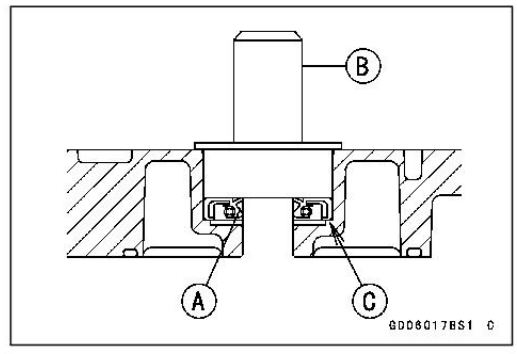



### *Water Pump Housing Assembly*

| NOTICE |
| --- |
| **Do not reuse the mechanical seal and oil seal.** |

- Apply grease to the oil seal lips [A].
- Press the new oil seal into the housing with a bearing driver [B] until it stops at the bottom surface [C] of the housing.

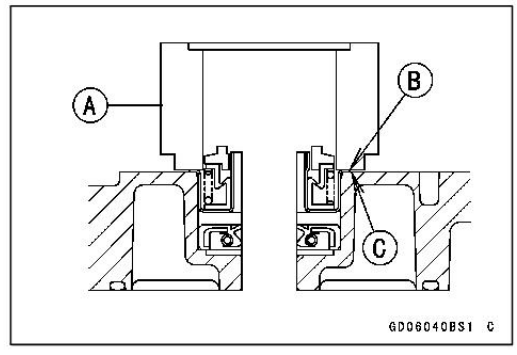
**Special Tool - Bearing Driver Set: 57001-1129**




| NOTICE |
| --- |
| **Be careful not to damage the sealing surface of the mechanical seal.** |

- Press the new mechanical seal into the housing with the oil seal driver [A] until its flange [B] touches the surface [C] of the housing.

**Special Tool - Oil Seal Driver $\phi$37.5: 57001-1660**

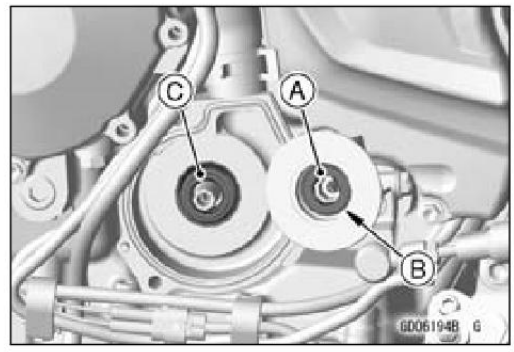



### *Mechanical Seal Inspection*

- Remove the water pump impeller (see Oil Pump Removal(7-14)).
- Visually inspect the mechanical seal.

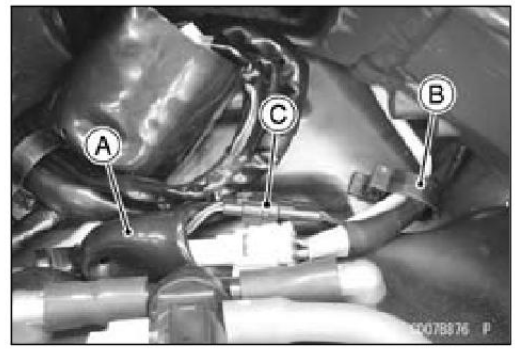
★If any one of the parts is damaged, replace the mechanical seal as a unit.

Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal [C]

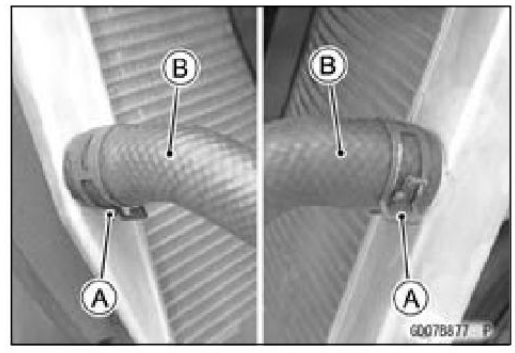


## Radiator

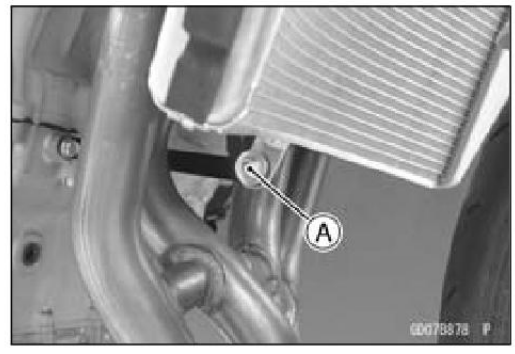
### *Radiator and Radiator Fan Removal*



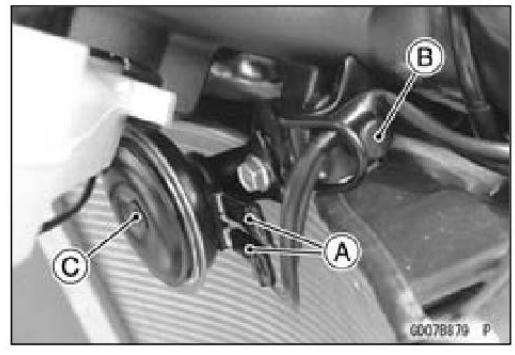

- Drain:
  Coolant (see Coolant Change(2-27))
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
  Coolant Reserve Tank (see Coolant Reserve Tank Removal(4-9))
- Slide the dust cover [A].
- Open the clamp [B].
- Disconnect the radiator fan motor connector [C].



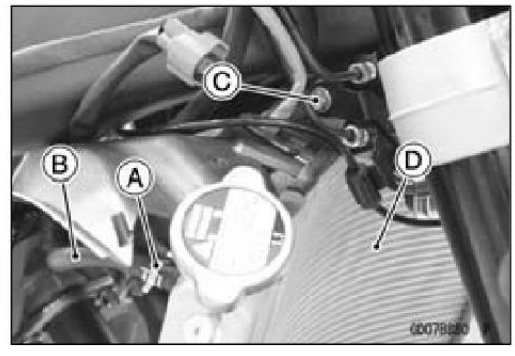

- Slide the clamps [A].
- Disconnect the water hoses [B].




- Remove:
  Radiator Bolt (Lower) [A]




- Disconnect:
  Horn Connectors [A]
- Remove:
  Cap [B] and Radiator Bolt (Upper Left)
  Horn [C] and Bracket



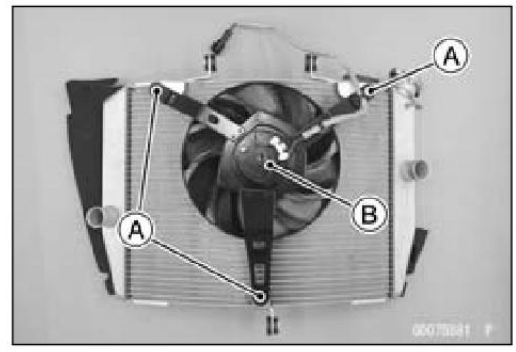

- Slide the clamp [A].
- Disconnect:
  Air Bleeder Hose [B]
- Remove:
  Radiator Bolt (Upper Right) [C]
  Brake Hose Bracket
  Radiator [D]

## Radiator

**NOTICE**

**Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.**

● Remove:
Radiator Fan Bolts [A]
Radiator Fan [B]

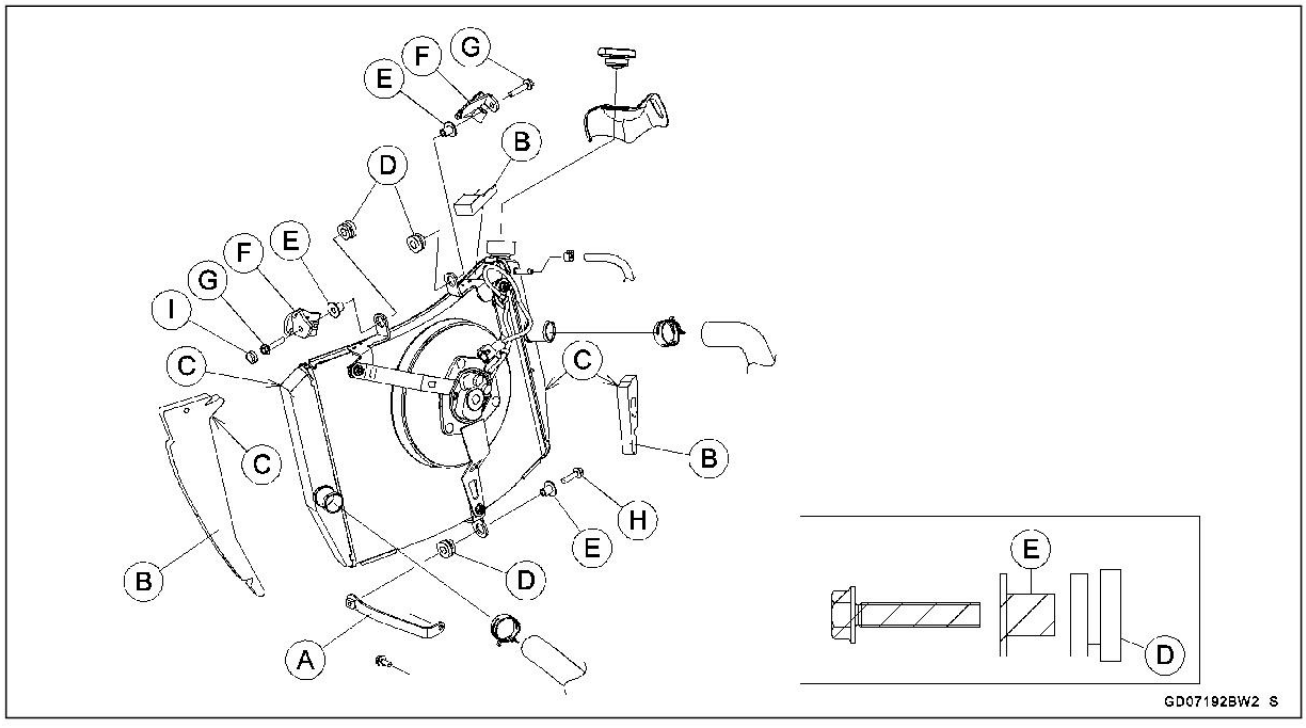



### *Radiator and Radiator Fan Installation*

★If the radiator bracket [A] is removed, install it to the lower crankcase.
● Install the radiator fan to the radiator.
● Tighten the radiator fan bolts.
● Install the pads [B].
○Install it so that the corners [C] align.
● Install the rubber dampers [D] and collars [E] as shown.
○Face the small diameter side of the damper to the collar.
● Run the radiator fan motor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
● Install the brackets [F].
● Tighten:

**Torque - Radiator Bolts (Upper) [G]: 10 N·m (1.0 kgf·m, 89 in·lb)**

● Tighten the radiator bolt (lower) [H].
● Install the cap [I].



## Radiator

- Install the hoses and clamps (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

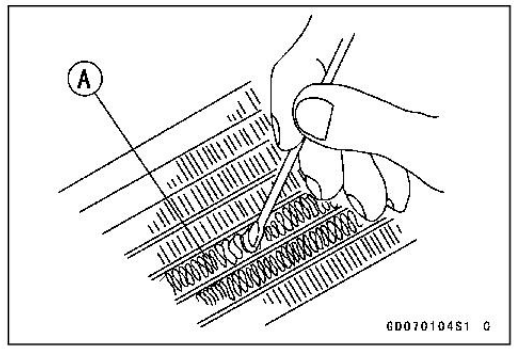
### *Radiator Inspection*

- Remove the radiator (see Radiator and Radiator Fan Removal(4-12)).
- Check the radiator core.

★If there are obstructions to air flow, remove them.

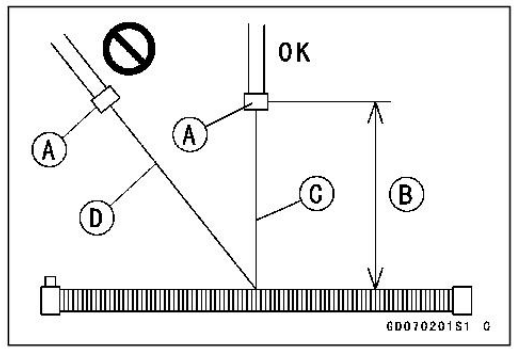
★If the corrugated fins [A] are deformed, carefully straighten them.

★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.




**NOTICE**

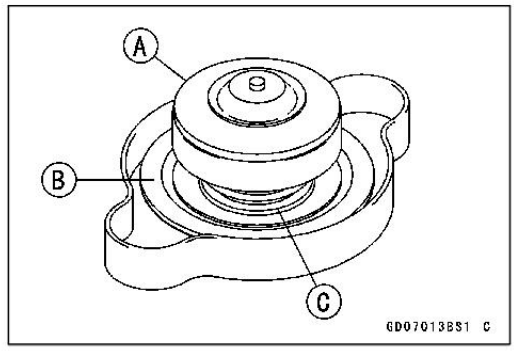
**When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:**
**Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.**
**Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.**
**Run the steam gun, following the core fin direction.**




### *Radiator Cap Inspection*

- Remove:
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

★If any one of them shows visible damage, replace the cap with a new one.



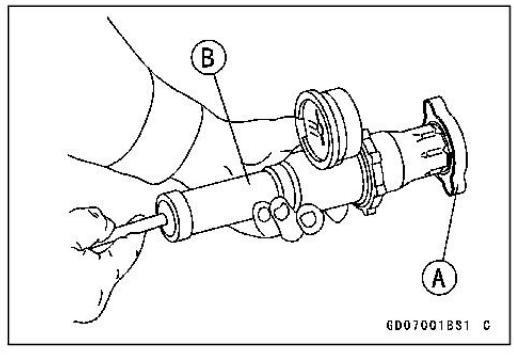

- Install the cap [A] on a cooling system pressure tester [B].

**NOTE**

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.

**Radiator Cap Relief Pressure**
**Standard: 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi)**

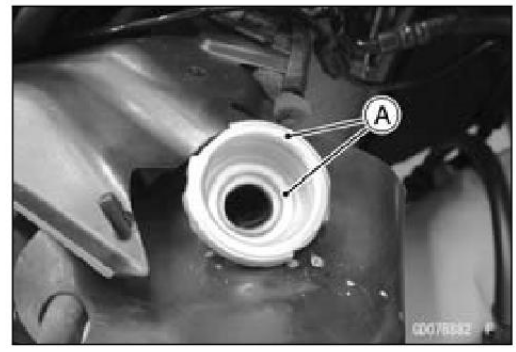



★If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.

## Radiator

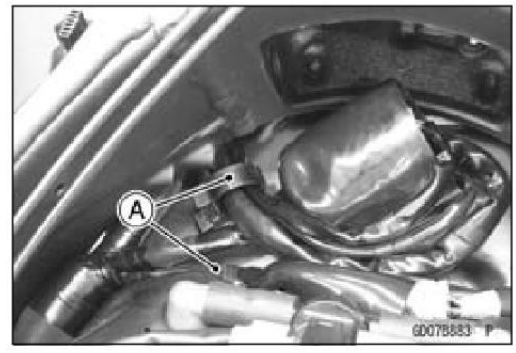
### *Radiator Filler Neck Inspection*

- Remove:
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.

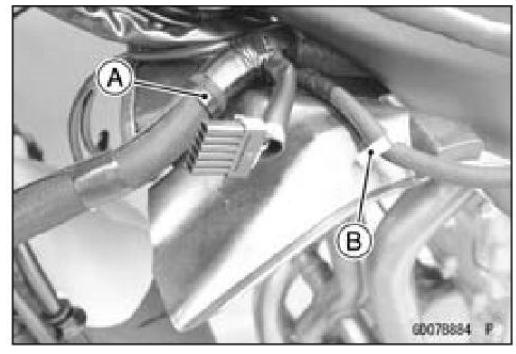



### *Heat Insulation Plate Removal*

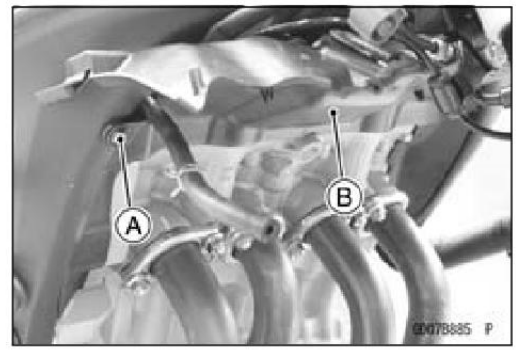
- Remove:
  Radiator (see Radiator and Radiator Fan Removal(4-12))
- Open the clamps [A].




- Open the clamp [A].
- Free the lead from the clamp [B].




- Free the right switch housing lead and front wheel rotation sensor lead from the clamp on the right side of the heat insulation plate.
- Remove:
  Heat Insulation Plate Bolt [A]
  Heat Insulation Plate [B]

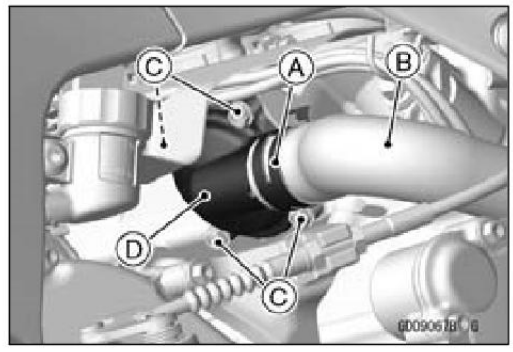



### *Heat Insulation Plate Installation*

- Installation is the reverse of removal.
- Replace the heat insulation plate bolt with a new one, and tighten it.
- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).

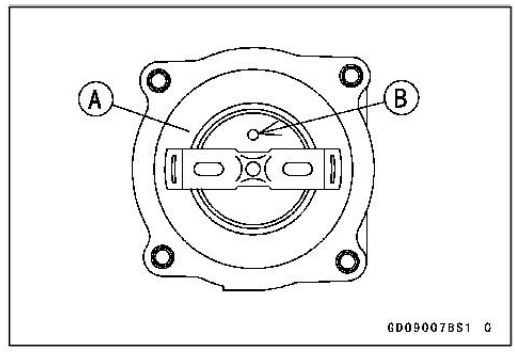
## Thermostat

### *Thermostat Removal*

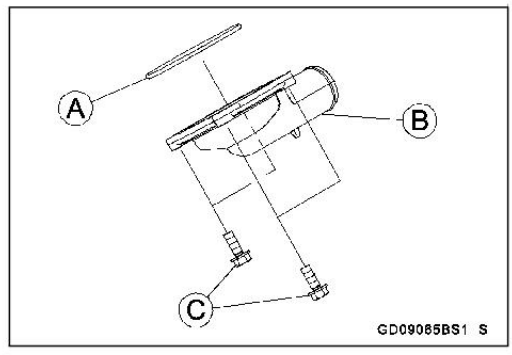



- Remove the oil cooler (see Oil Cooler Removal(7-18)).
- Slide the clamp [A].
- Disconnect the water hose [B].
- Remove:
  Thermostat Cover Bolts [C]
  Thermostat Cover [D]
  Thermostat

### *Thermostat Installation*




- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.

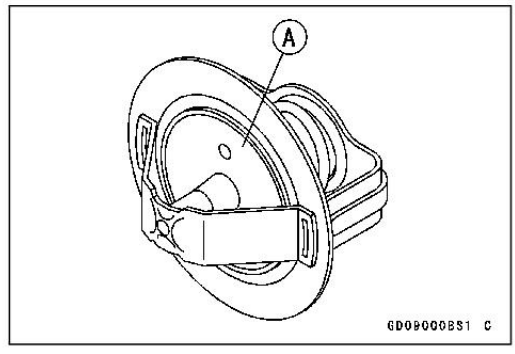



- Replace the O-ring [A] with a new one.
- Install a new O-ring into the thermostat cover [B].
- Tighten:

  **Torque - Thermostat Cover Bolts [C]: 6.0 N·m (0.61 kgf·m, 53 in·lb)**

- Confirm that the thermostat is installed correctly.
- Install the water hose and clamp (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

### *Thermostat Inspection*




- Remove the thermostat (see Thermostat Removal(4-16)).
- Inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the thermostat with a new one.

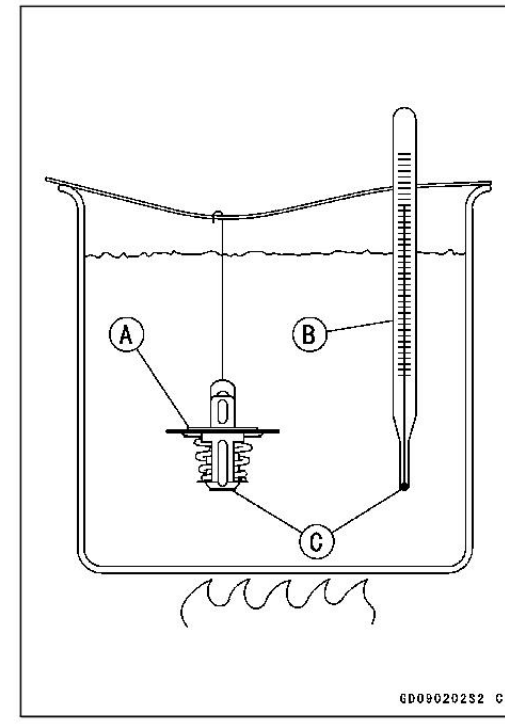
## Thermostat

● To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

★If the measurement is out of the specified range, replace the thermostat with a new one.

**Thermostat Valve Opening Temperature**
**58 – 62°C (136 – 144°F)**



## Hoses and Pipes

### *Hose Installation*

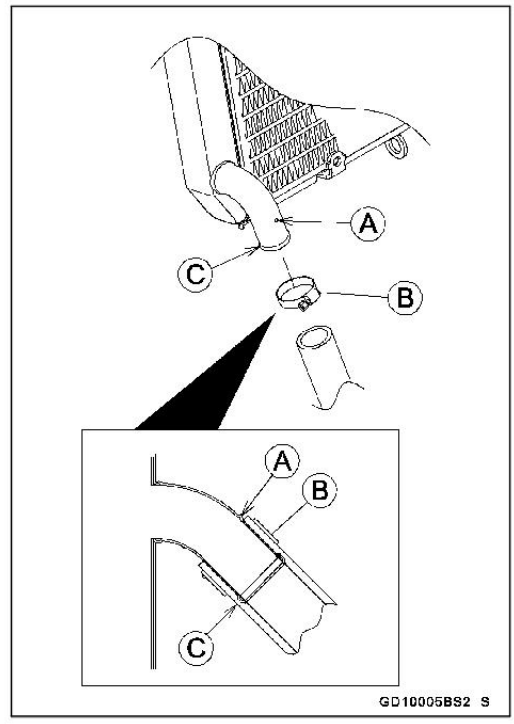
- Run the hoses (see Cable, Wire, and Hose Routing section (18-2)).
- Install the hoses and pipes.

○Be careful to follow bending direction of the hoses, and avoid sharp bending, kinking, flattening or twisting.

○If the hose fitting has a small projection [A], insert the water hose until it comes into contact with the projection shape (Hose shall not ride on the projection shape).

- Install the clamp [B] between the hose retaining bulge [C] and projection of the fitting to prevent contacting them. This will prevent the hoses from working loose.

○There are cases when the clamping position describes in detail in the Periodic Maintenance chapter or Appendix chapter.




### *Hose Inspection*

- Refer to the Radiator Hose and Pipe Inspection (see Cooling System(2-27)).

## Water Temperature Sensor

### *Water Temperature Sensor Removal*

- Refer to the Water Temperature Sensor Removal (see Water Temperature Sensor Removal(17-69)).

### *Water Temperature Sensor Installation*

- Refer to the Water Temperature Sensor Installation (see Water Temperature Sensor Installation(17-69)).

### *Water Temperature Sensor Inspection*

- Refer to the Water Temperature Sensor Inspection (see Water Temperature Sensor Inspection(16-99)).

# Engine Top End

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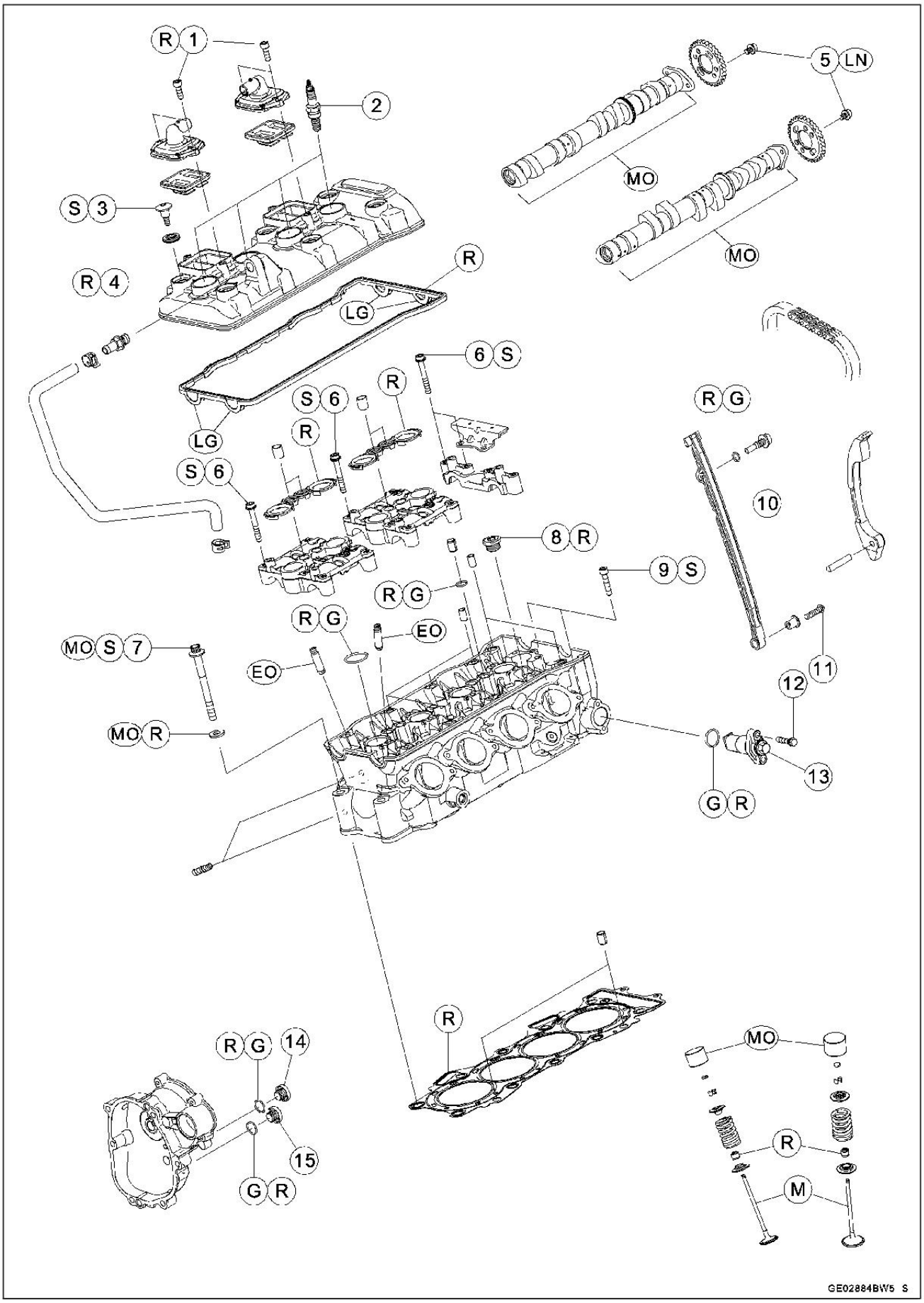
## Exploded View

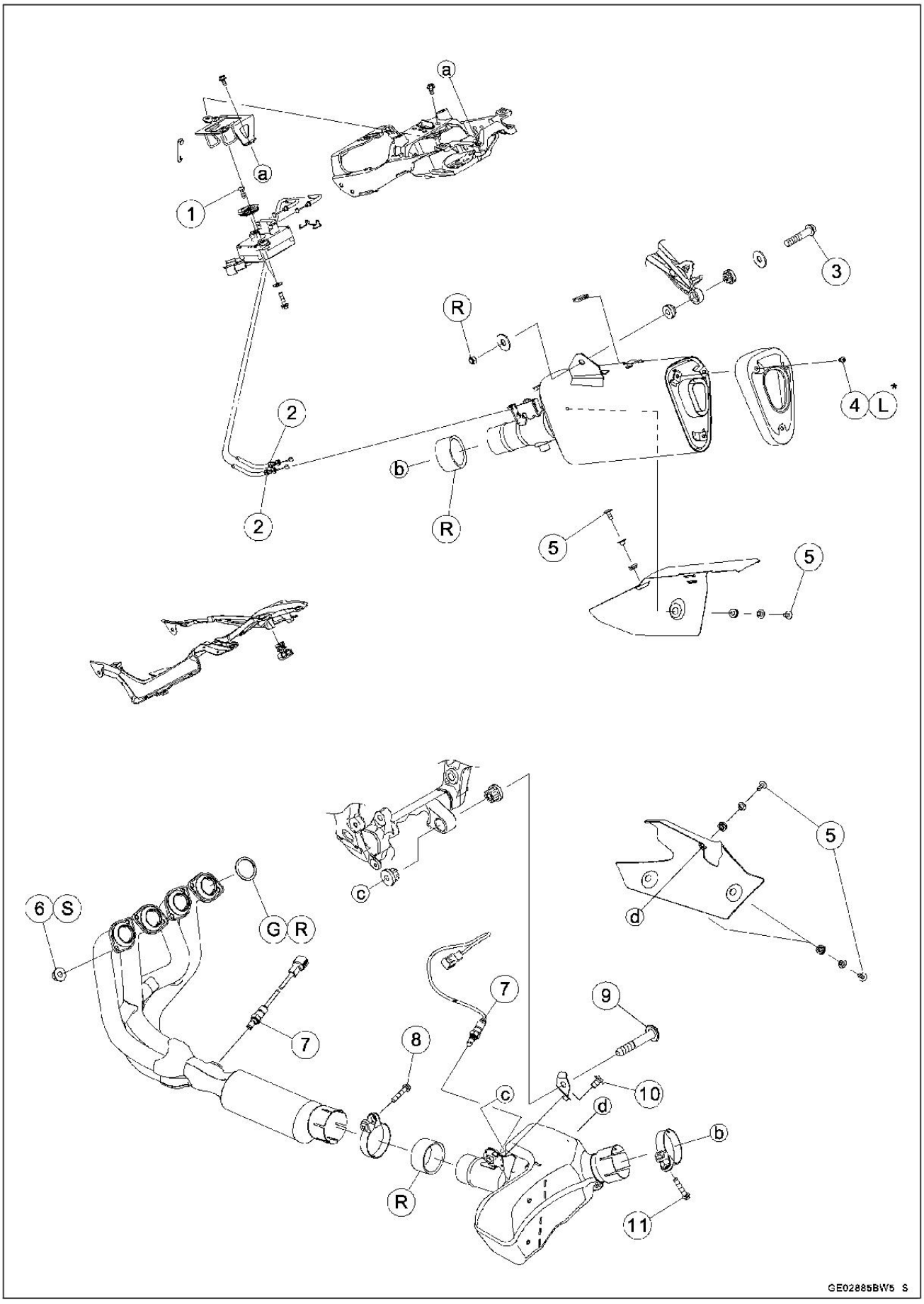


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Air Suction Valve Cover Bolts | 10 | 1.0 | 89 in·lb | R |
| 2 | Spark Plugs | 13 | 1.3 | 115 in·lb | |
| 3 | Cylinder Head Cover Bolts | 10 | 1.0 | 89 in·lb | S |
| 4 | Breather Hose Fitting | 15 | 1.5 | 11 | R |
| 5 | Camshaft Sprocket Bolts | 15 | 1.5 | 11 | LN |
| 6 | Camshaft Cap Bolts, First | 6.0 | 0.61 | 53 in·lb | S |
| | Camshaft Cap Bolts, Final | 12 | 1.2 | 106 in·lb | S |
| 7 | Cylinder Head Bolts (M9) | see text | ← | ← | MO, S |
| 8 | Cylinder Head Water Jacket Plugs | 19.6 | 2.0 | 14.5 | R |
| 9 | Cylinder Head Bolts (M6) | 12 | 1.2 | 106 in·lb | S |
| 10 | Front Camshaft Chain Guide Bolt (Upper) | 25 | 2.5 | 18 | |
| 11 | Front Camshaft Chain Guide Bolt (Lower) | 12 | 1.2 | 106 in·lb | |
| 12 | Camshaft Chain Tensioner Bolts | 11 | 1.1 | 97 in·lb | |
| 13 | Camshaft Chain Tensioner Cap Bolt | 20 | 2.0 | 15 | |
| 14 | Starter Motor Clutch Bolt Cap | 3.0 | 0.31 | 27 in·lb | |
| 15 | Timing Inspection Cap | 3.0 | 0.31 | 27 in·lb | |

EO: Apply engine oil.
G: Apply grease.
LG: Apply liquid gasket.
LN: Apply a non-permanent locking agent (High strength: Loctite 648 or equivalent).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

## Exploded View



## Exploded View

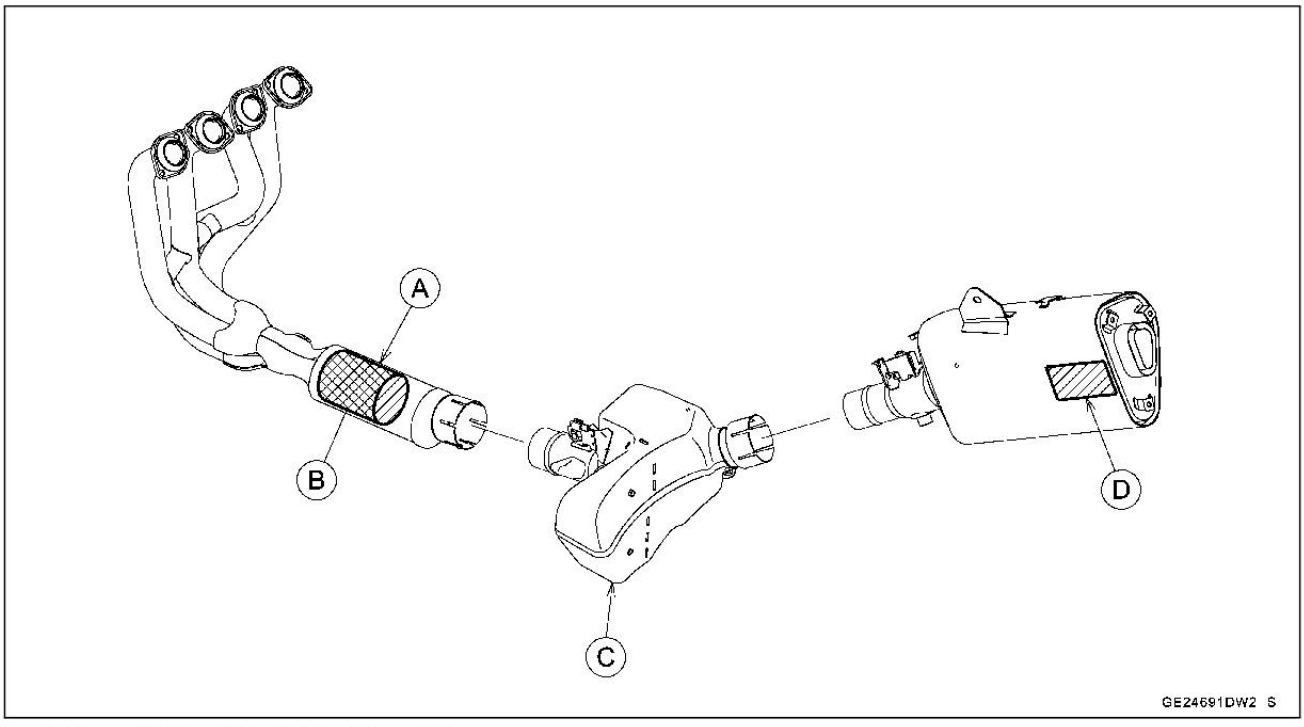
| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Exhaust Butterfly Valve Actuator Pulley Bolt | 5.0 | 0.51 | 44 in·lb | |
| 2 | Exhaust Butterfly Valve Cable Locknuts | 5.0 | 0.51 | 44 in·lb | |
| 3 | Muffler Body Bolt | 25 | 2.5 | 18 | |
| 4 | Muffler Body End Cover Bolts | 7.0 | 0.71 | 62 in·lb | *L |
| 5 | Muffler Cover Bolts | 7.0 | 0.71 | 62 in·lb | |
| 6 | Exhaust Pipe Holder Nuts | 20 | 2.0 | 15 | S |
| 7 | Oxygen Sensor | 25 | 2.5 | 18 | |
| 8 | Exhaust Pipe Clamp Bolt | 20 | 2.0 | 15 | |
| 9 | Premuffler Chamber Bolt | 40 | 4.1 | 30 | |
| 10 | Premuffler Chamber Bracket Bolt | 40 | 4.1 | 30 | |
| 11 | Muffler Body Clamp Bolt | 20 | 2.0 | 15 | |

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
*L: Apply a non-permanent locking agent (Three Bond: TB1360G or equivalent).

## Exhaust System Identification for WVTA

### ZX636JR

| Exhaust Pipe | Premuffler Chamber | Muffler |
|---|---|---|
| P/No. 39178-0332<br>Mark: KHI M 205 | P/No. 49062-0740<br>Mark: KHI M 147 | P/No. 18091-1155<br>Mark: KHI K 680 |




Exhaust Pipe Mark Position [A]
Honeycomb Type Catalyst Position [B]
Premuffler Chamber Mark Position [C]
Muffler Mark Position [D]

## Specifications

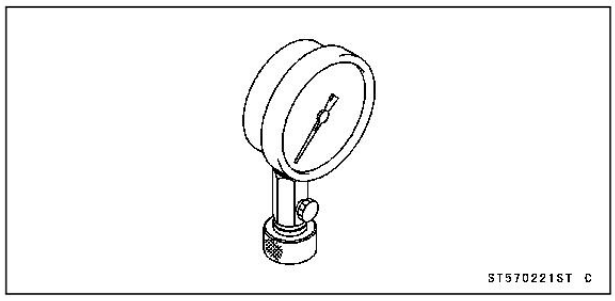
| Item | Standard | Service Limit |
|---|---|---|
| **Camshafts** | | |
| Cam Height: | | |
| Exhaust | 33.143 – 33.257 mm (1.3048 – 1.3093 in.) | 33.24 mm (1.309 in.) |
| Intake | 34.543 – 34.657 mm (1.3600 – 1.3644 in.) | 34.44 mm (1.356 in.) |
| Camshaft Journal/Camshaft Cap Clearance | 0.038 – 0.081 mm (0.0015 – 0.0032 in.) | 0.17 mm (0.0067 in.) |
| Camshaft Journal Diameter | 23.940 – 23.962 mm (0.94252 – 0.94338 in.) | 23.91 mm (0.9413 in.) |
| Camshaft Bearing Inside Diameter | 24.000 – 24.021 mm (0.94488 – 0.94571 in.) | 24.08 mm (0.9480 in.) |
| Camshaft Runout | TIR 0.02 mm (0.0008 in.) or less | TIR 0.1 mm (0.004 in.) |
| **Cylinder Head** | | |
| Cylinder Compression | (Usable Range) 980 – 1 498 kPa (10.00 – 15.28 kgf/cm², 142 – 217.2 psi) @280 r/min (rpm) | – – – |
| Cylinder Head Warp | - - - | 0.05 mm (0.002 in.) |
| **Valves** | | |
| Valve Clearance: | | |
| Exhaust | 0.24 – 0.31 mm (0.0094 – 0.0122 in.) | – – – |
| Intake | 0.13 – 0.19 mm (0.0051 – 0.0075 in.) | – – – |
| Valve Head Thickness: | | |
| Exhaust | 1.0 mm (0.039 in.) | 0.6 mm (0.02 in.) |
| Intake | 0.5 mm (0.020 in.) | 0.3 mm (0.01 in.) |
| Valve Stem Bend | TIR 0.01 mm (0.0004 in.) or less | TIR 0.05 mm (0.002 in.) |
| Valve Stem Diameter: | | |
| Exhaust | 3.955 – 3.970 mm (0.1557 – 0.1563 in.) | 3.94 mm (0.155 in.) |
| Intake | 3.975 – 3.990 mm (0.1565 – 0.1571 in.) | 3.96 mm (0.156 in.) |
| Valve Guide Inside Diameter: | | |
| Exhaust | 4.000 – 4.012 mm (0.1575 – 0.1580 in.) | 4.08 mm (0.161 in.) |
| Intake | 4.000 – 4.012 mm (0.1575 – 0.1580 in.) | 4.08 mm (0.161 in.) |
| Valve/Valve Guide Clearance (Wobble Method): | | |
| Exhaust | 0.09 – 0.17 mm (0.0035 – 0.0067 in.) | 0.37 mm (0.015 in.) |
| Intake | 0.03 – 0.11 mm (0.0012 – 0.0043 in.) | 0.31 mm (0.012 in.) |
| Valve Seat Cutting Angle | 32°, 45°, 60° | – – – |

## Specifications

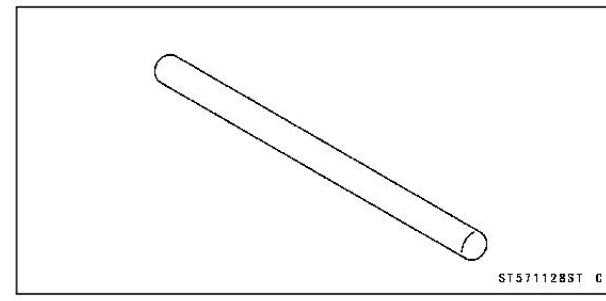
| Item | Standard | Service Limit |
|---|---|---|
| Valve Seating Surface: | | |
| Outside Diameter: | | |
| Exhaust | 22.8 – 23.0 mm (0.90 – 0.91 in.) | – – – |
| Intake | 26.9 – 27.1 mm (1.06 – 1.07 in.) | – – – |
| Width: | | |
| Exhaust | 0.8 – 1.2 mm (0.031 – 0.047 in.) | – – – |
| Intake | 0.5 – 1.0 mm (0.020 – 0.039 in.) | – – – |
| Valve Spring Free Length: | | |
| Exhaust | 41.3 mm (1.63 in.) | 39.9 mm (1.57 in.) |
| Intake | 40.0 mm (1.57 in.) | 38.5 mm (1.52 in.) |

## Special Tools and Sealant

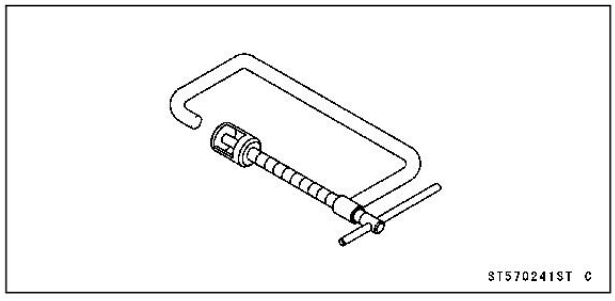
**Compression Gauge, 20 kgf/cm²:**
**57001-221**



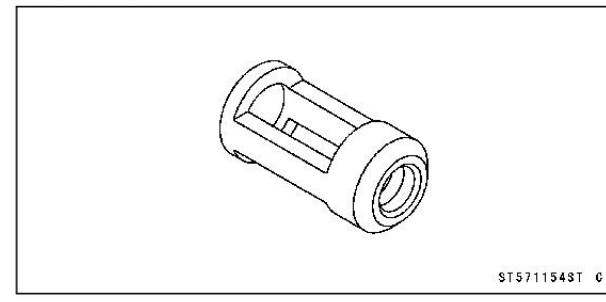

**Valve Seat Cutter Holder Bar:**
**57001-1128**



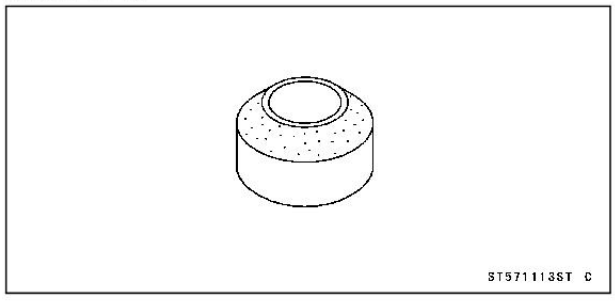

**Valve Spring Compressor Assembly:**
**57001-241**



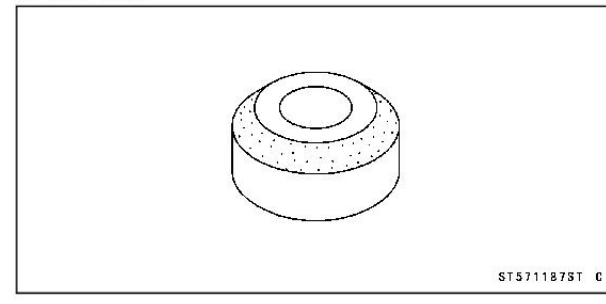

**Valve Spring Compressor Adapter, $\phi$20:**
**57001-1154**



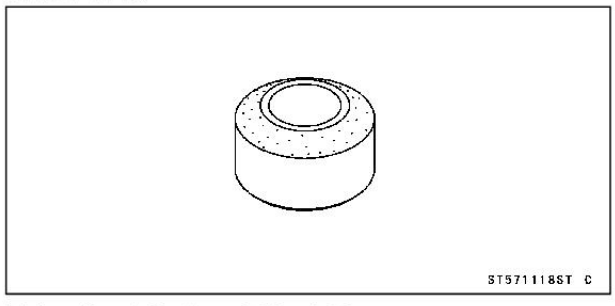

**Valve Seat Cutter, 45° - $\phi$24.5:**
**57001-1113**



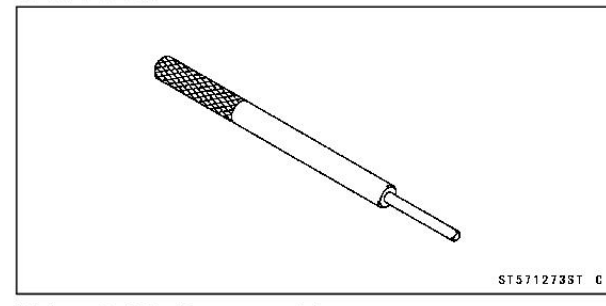

**Valve Seat Cutter, 45° - $\phi$30:**
**57001-1187**



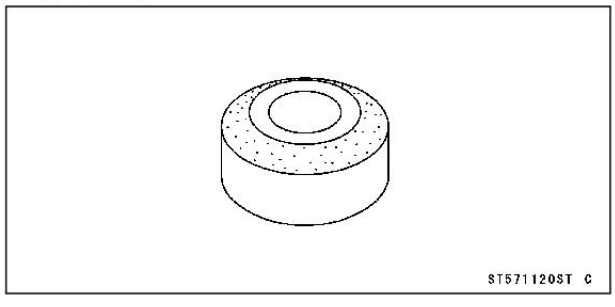

**Valve Seat Cutter, 32° - $\phi$25:**
**57001-1118**



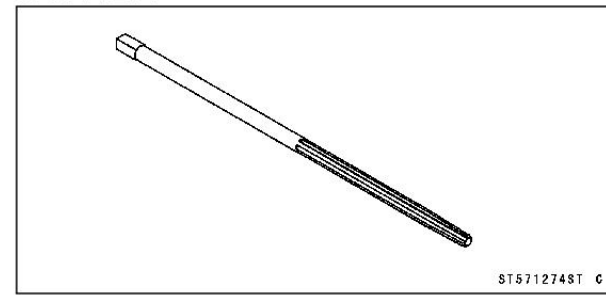

**Valve Guide Arbor, $\phi$4:**
**57001-1273**




**Valve Seat Cutter, 32° - $\phi$30:**
**57001-1120**

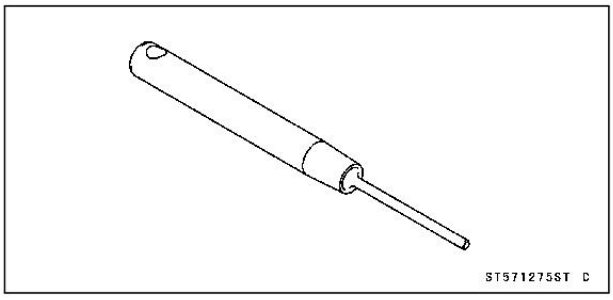



**Valve Guide Reamer, $\phi$4:**
**57001-1274**

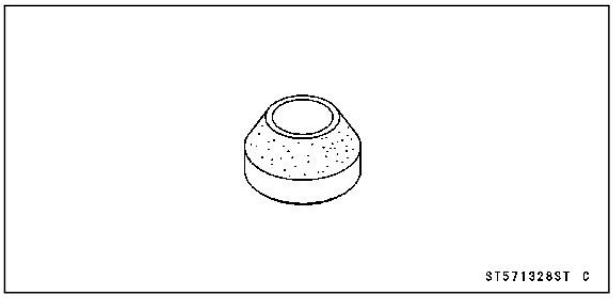


## Special Tools and Sealant

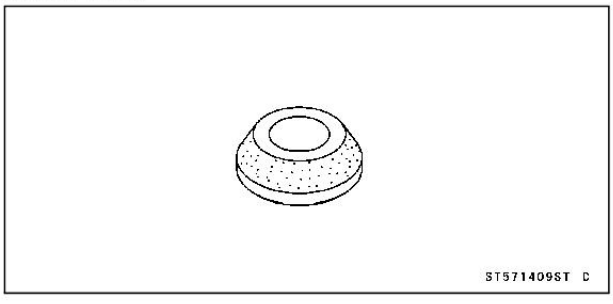
**Valve Seat Cutter Holder, $\phi$4:**
**57001-1275**



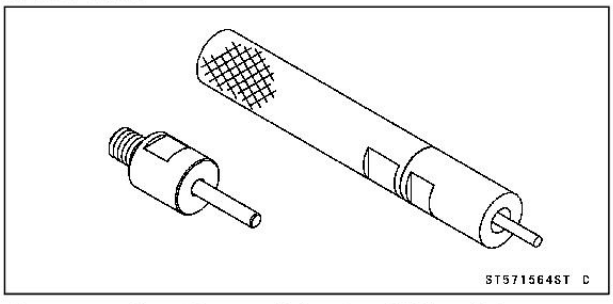

**Valve Seat Cutter, 60° - $\phi$25:**
**57001-1328**



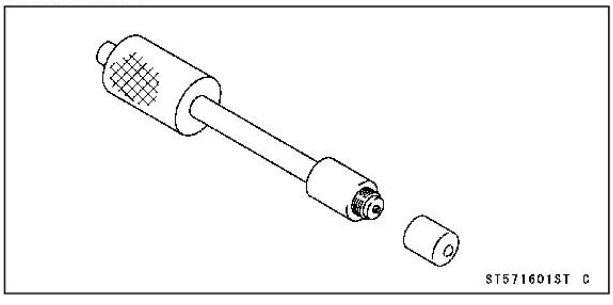

**Valve Seat Cutter, 60° - $\phi$27:**
**57001-1409**



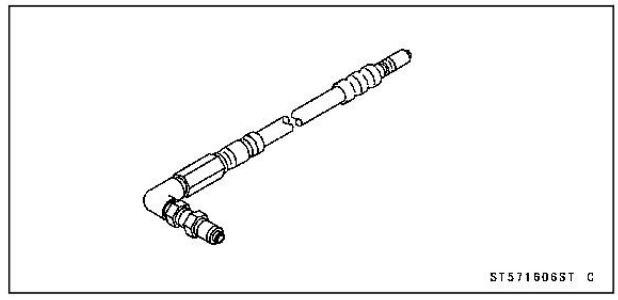

**Valve Guide Driver:**
**57001-1564**



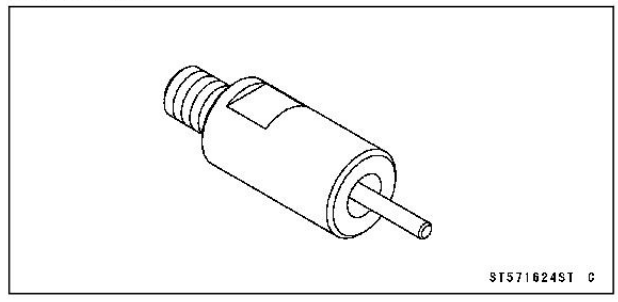

**Compression Gauge Adapter, M10 × 1.0:**
**57001-1601**



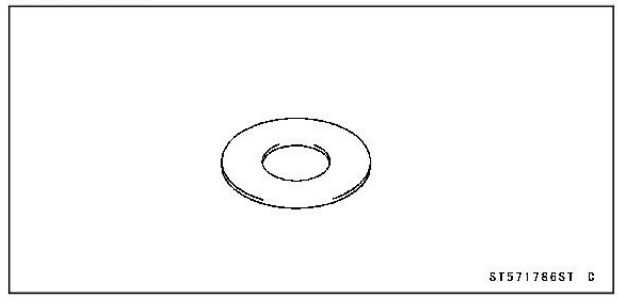

**L-Shape Hose:**
**57001-1606**



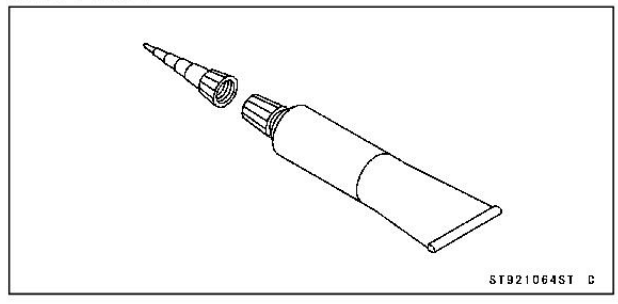

**Valve Guide Driver Attachment, C:**
**57001-1624**




**Spacer:**
**57001-1786**



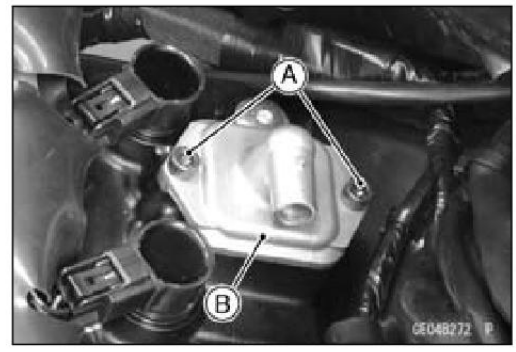

**Liquid Gasket, TB1216B:**
**92104-1064**



## Clean Air System

### *Air Suction Valve Removal*

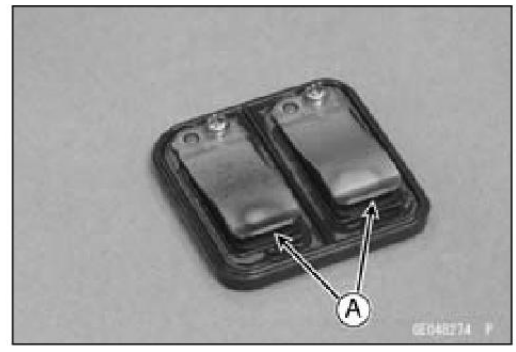
- Remove:
  Air Switching Valve Hoses (see Air Switching Valve Removal(5-12))
- Turn up the front side of the heat insulation rubber plate.
- Remove:
  Air Suction Valve Cover Bolts [A] (Both Sides)
  Air Suction Valve Cover [B] (Both Sides)




- Remove the air suction valve [A] on both sides.

### *Air Suction Valve Installation*

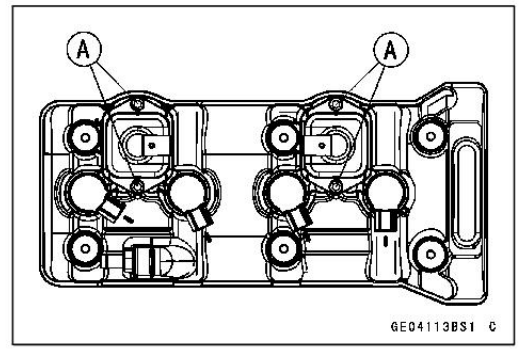
- Install the air suction valve so that opening [A] of the reed faces the rear and downward.
- Install the air suction valve cover (Both Sides).




- Replace the air suction valve cover bolts [A] with new ones, and tighten them.

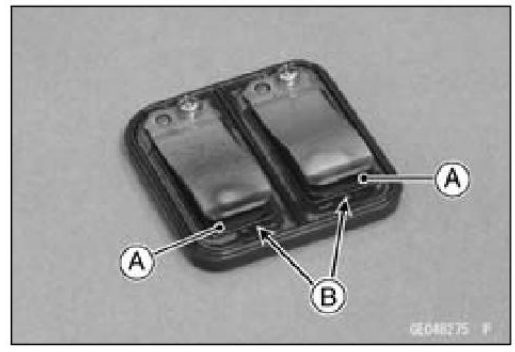
  **Torque - Air Suction Valve Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Install:
  Air Switching Valve Hoses (see Air Switching Valve Installation(5-13))
  Heat Insulation Rubber Plate (see Cable, Wire, and Hose Routing section (18-2))



## Clean Air System

### *Air Suction Valve Inspection*




- Remove the air suction valve (see Air Suction Valve Removal(5-11)).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage or other damage.

★If there is any doubt as to the condition of the reeds, replace the air suction valve as an assembly.

- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.

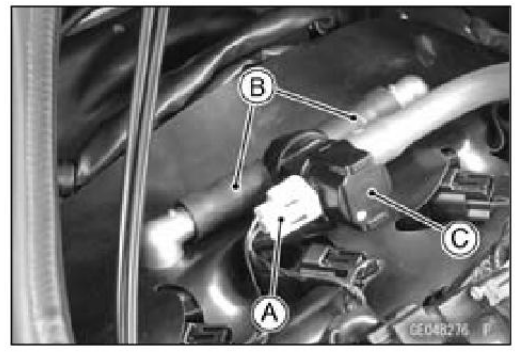
★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

★If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.

| *NOTICE* |
| --- |
| **Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.** |

### *Air Switching Valve Removal*

| *NOTICE* |
| --- |
| **Never drop the air switching valve especially on a hard surface. Such a shock to the air switching valve can damaged it.** |

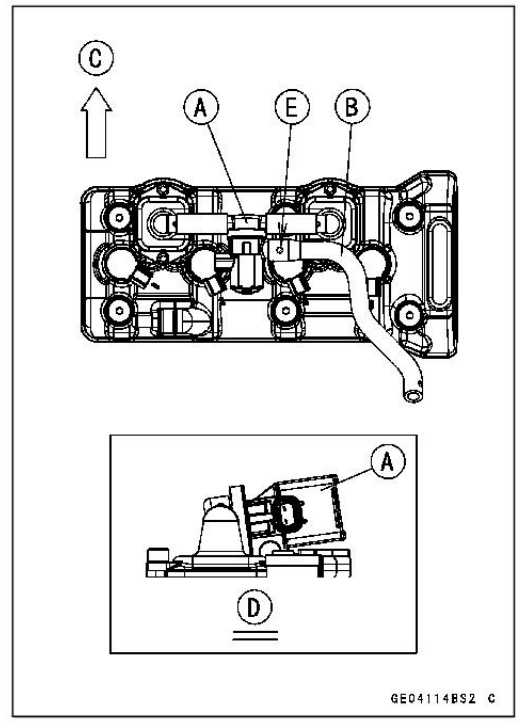



- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Disconnect the air switching valve connector [A].
- Disconnect the hoses [B] from the air suction valve covers.
- Remove the air switching valve [C].

## Clean Air System

### *Air Switching Valve Installation*

- Installation is the reverse of removal.
- Install the air switching valve [A] with hose [B] as shown.
  Front [C]
  Left Side View [D]
  White Paint [E]




### *Air Switching Valve Operation Test*

- Refer to the Air Suction System Damage Inspection (see Air Suction System Damage Inspection(2-34)).

### *Air Switching Valve Unit Test*

- Refer to the Air Switching Valve Unit Test (see Air Switching Valve Unit Test(16-58)).

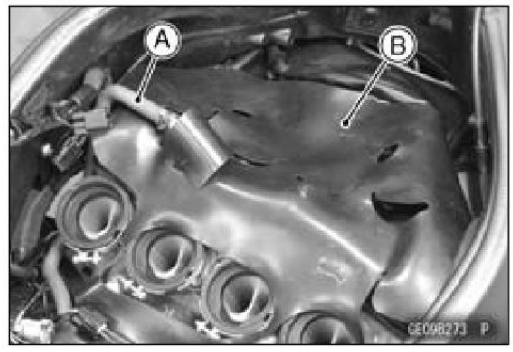
### *Clean Air System Hose Inspection*

- Be sure that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve covers.

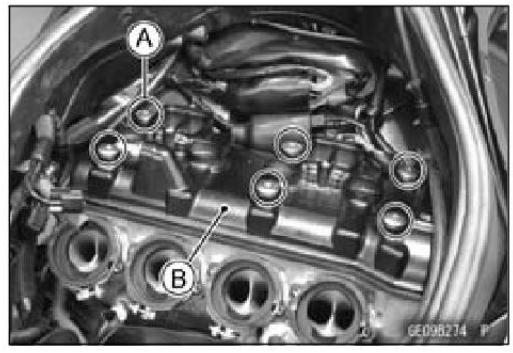
★If they are not, correct them. Replace them if they are damaged.

## Cylinder Head Cover

### *Cylinder Head Cover Removal*

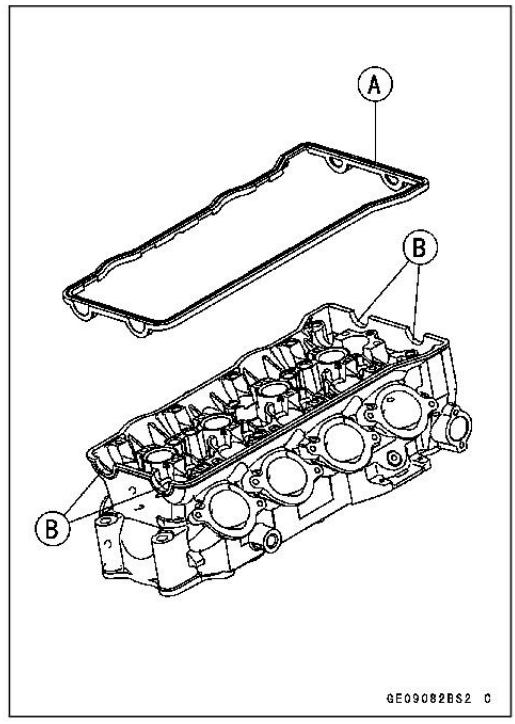



- Remove:
  Air Suction Valves (see Air Suction Valve Removal(5-11))
  Throttle Body Assy (see Throttle Body Assy Removal(3-28))
  Stick Coils (see Stick Coil Removal(16-41))
- Disconnect the breather hose [A].
- Turn up the front side of the heat insulation rubber plate [B].




- Remove:
  Cylinder Head Cover Bolts [A] with Rubber Washers
  Cylinder Head Cover [B]

### *Cylinder Head Cover Installation*



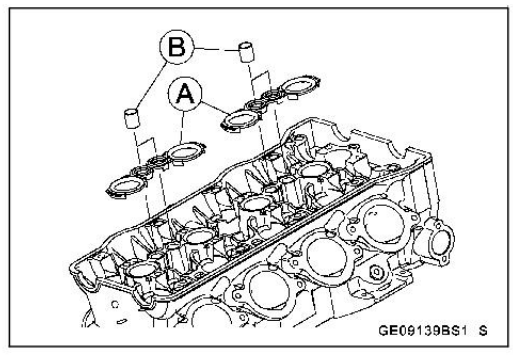

- Replace the cylinder head cover gasket [A] with a new one.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [B] to the cylinder head as shown.

**Sealant - Liquid Gasket, TB1216B: 92104-1064**

- Install the new cylinder head cover gasket.

**NOTE**

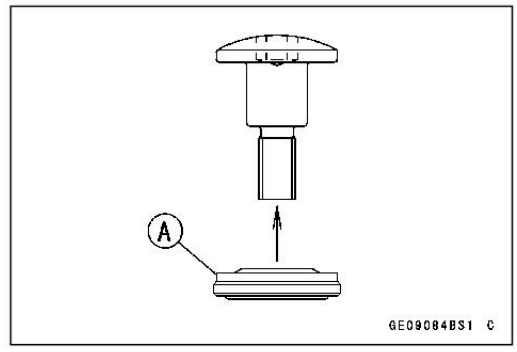
○*Make the application finish within 20 minutes with the liquid gasket (TB1216B) to the mating surface of the cylinder head cover is applied.*




- Replace the plug hole gaskets [A] with new ones.
- Be sure to install the following parts.
  Dowel Pins [B]
  Plug Hole Gaskets

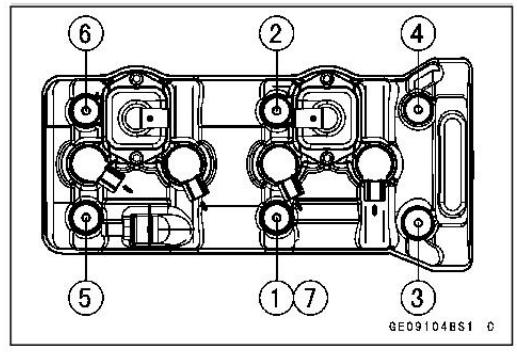
## Cylinder Head Cover

- Install the cylinder head cover.
- Install the rubber washers [A] with the metal side faces upward.




- Tighten the cover bolts following the specified tightening sequence [1 – 7].

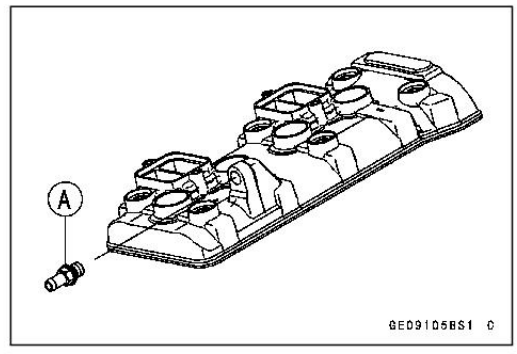
**Torque - Cylinder Head Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**




- When installing the breather hose fitting [A], note the following.

○Replace the breather hose fitting with a new one, and tighten it.

**Torque - Breather Hose Fitting: 15 N·m (1.5 kgf·m, 11 ft·lb)**




- Install the heat insulation rubber plate (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

## Camshaft Chain Tensioner

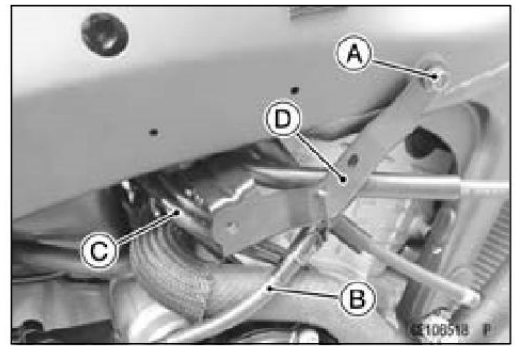
### *Camshaft Chain Tensioner Removal*

| *NOTICE* |
| --- |
| **This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.**<br>**When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation."**<br>**Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.** |

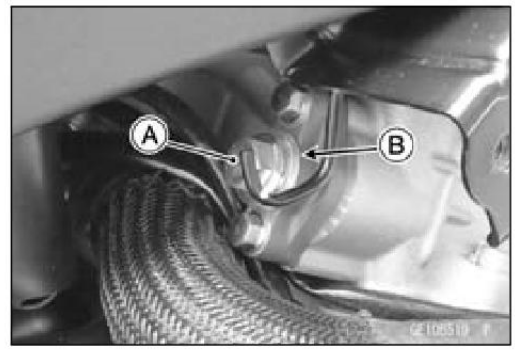
- Remove:
  Right Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Bolt [A]
- Free the clutch cable [B] and leads [C] from the bracket [D].

**NOTE**

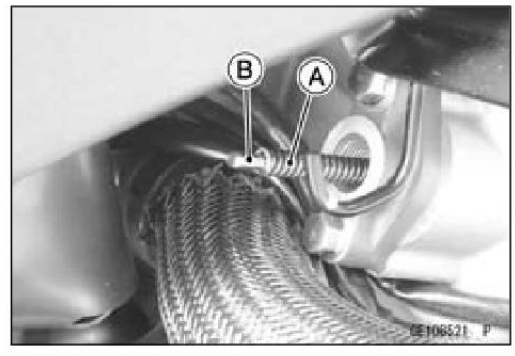
○*Cover the bracket with a cloth to avoid damaging other parts.*




- Remove:
  Cap Bolt [A]
  Washer [B]

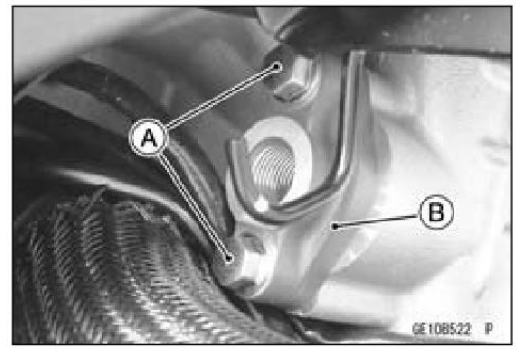



- Remove:
  Spring [A]
  Rod [B]



## Camshaft Chain Tensioner

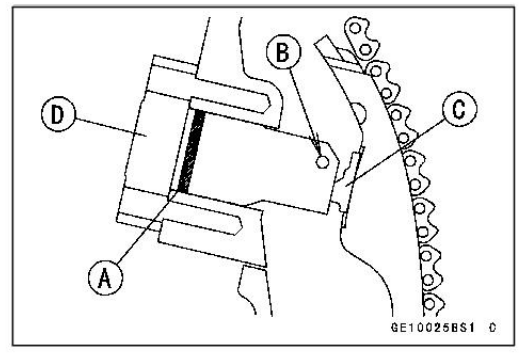
- Remove:
  Camshaft Chain Tensioner Bolts [A]
  Camshaft Tensioner Body [B]




### *Camshaft Chain Tensioner Installation*

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Release the stopper [B] and push the push rod [C] into the interior of the tensioner body [D].

○Install the tensioner body so that the stopper faces upward.



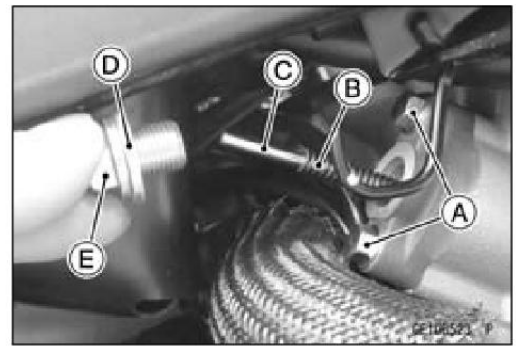

- Tighten:

**Torque - Camshaft Chain Tensioner Bolts [A]: 11 N·m (1.1 kgf·m, 97 in·lb)**

- Install:
  Spring [B]
  Rod [C]
  Washer [D]
  Camshaft Chain Tensioner Bolt [E]
- Tighten:

**Torque - Camshaft Chain Tensioner Cap Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)**

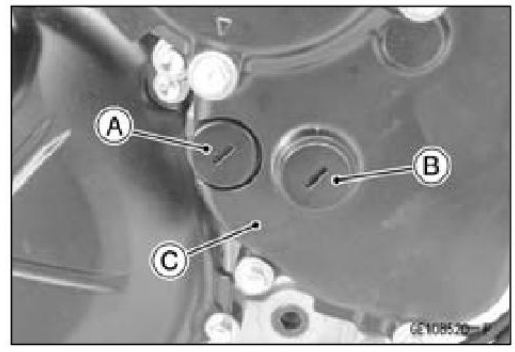
- Install the removed parts.



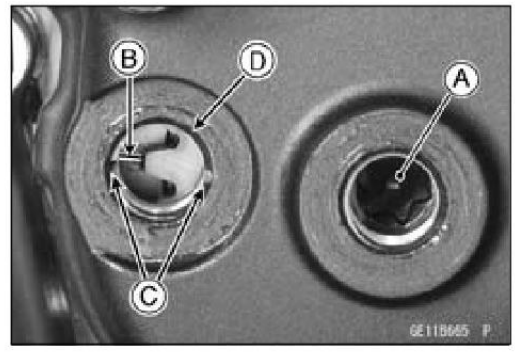
## Camshaft, Camshaft Chain

### *Camshaft Removal*

- Remove the cylinder head cover (see Cylinder Head Cover Removal(5-14)).
- Remove the timing inspection cap [A] and starter clutch bolt cap [B] on the starter clutch cover [C].

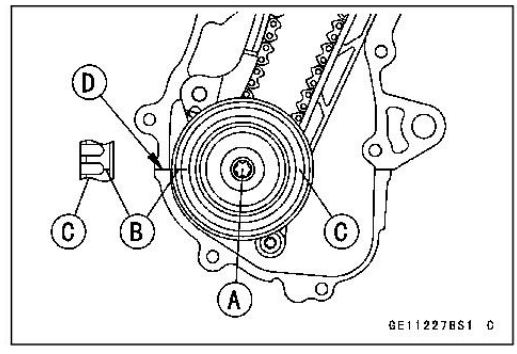



- Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.



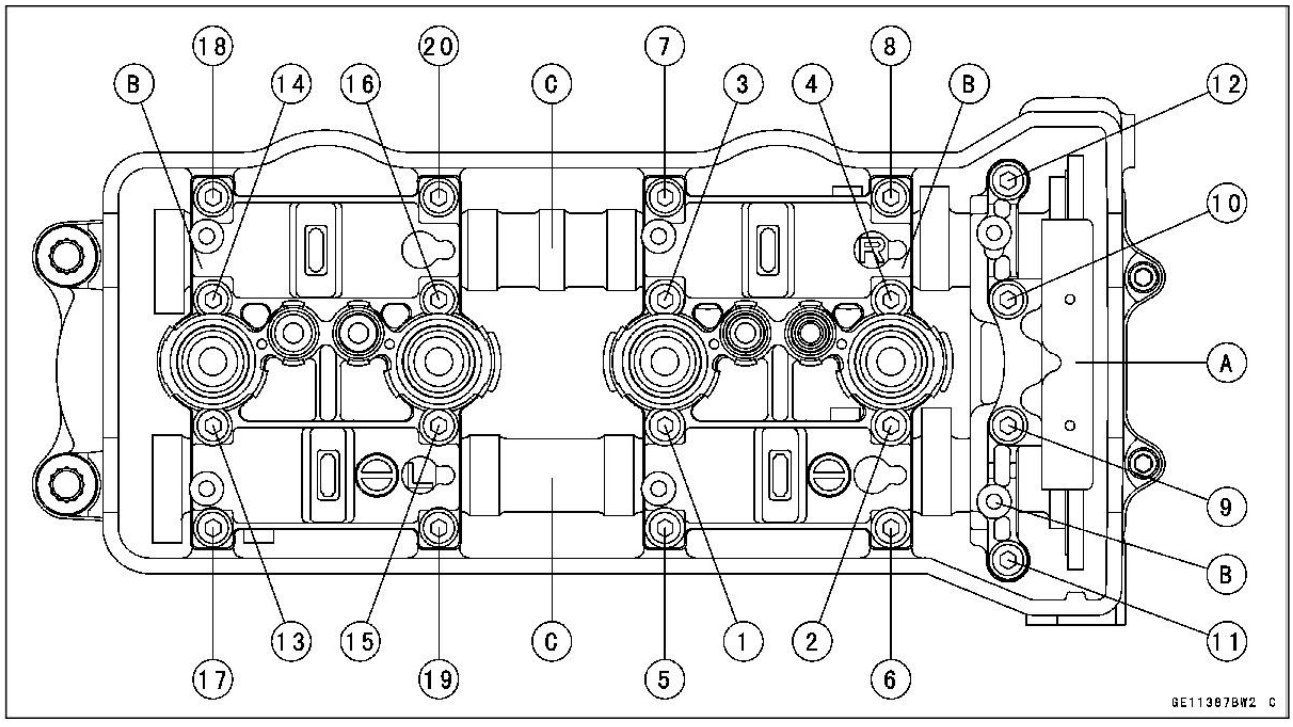

★If the starter clutch cover was removed, perform the next procedure.

○Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch [C] is aligned with the mating surface [D] of the crankcase.

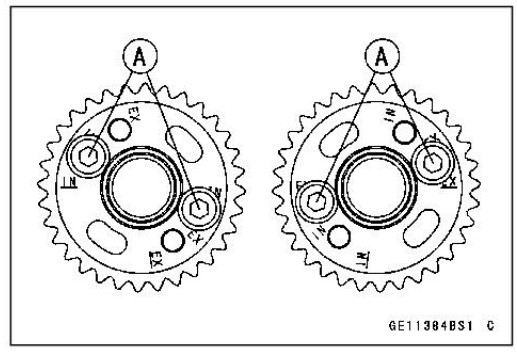


## Camshaft, Camshaft Chain

- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal(5-16)).
- Loosen the camshaft cap bolts gradually and evenly as shown sequence [1 – 20], and remove them.
- Remove:
  Upper Camshaft Chain Guide [A]
  Camshaft Caps [B]
  Camshafts [C]
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.




- Remove:
  Camshaft Sprocket Bolts [A]
  Camshaft Sprockets



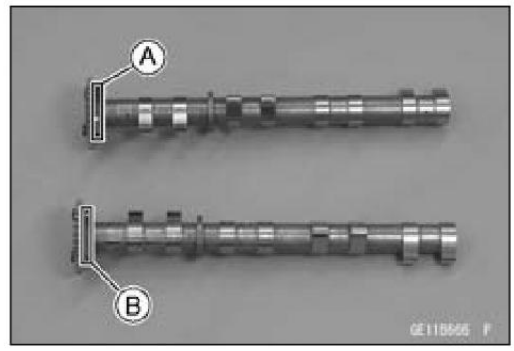

**NOTICE**

**The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.**

### *Camshaft Installation*

**NOTE**

○*The exhaust camshaft has a 2716 EX mark [A] and the intake camshaft has a 2716 IN mark [B]. Be careful not to mix up these shafts.*



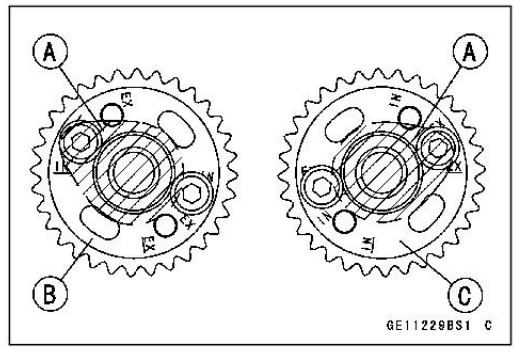
## Camshaft, Camshaft Chain

● Install the camshaft sprockets as shown.
#4 Cam Positions [A]
Intake Camshaft Sprocket [B]
Exhaust Camshaft Sprocket [C]

○The intake camshaft sprocket and exhaust camshaft sprocket are identical.

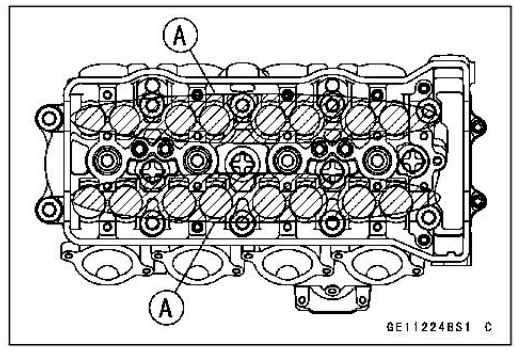
● Apply a non-permanent locking agent to the threads of the camshaft sprocket bolts and tighten them.

**Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)**




● Apply molybdenum disulfide oil solution [A] to all cam parts, journals and tappets.

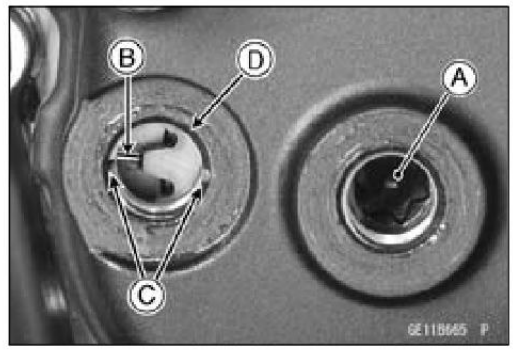
★If a new camshaft is to be used, apply a thin coat of molybdenum disulfide grease to the cam surfaces.




● Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch is aligned with the notches [C] in the edge of the timing inspection hole [D] in the starter clutch cover.

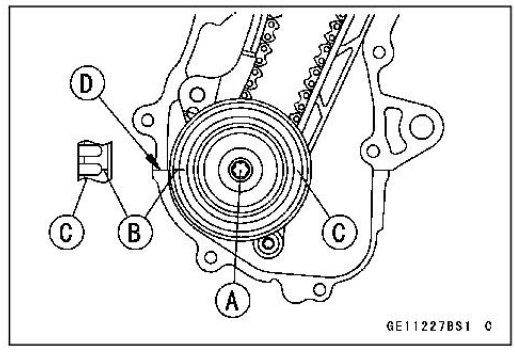
***NOTICE***

**The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.**




★If the starter clutch cover was removed, perform the next procedure.

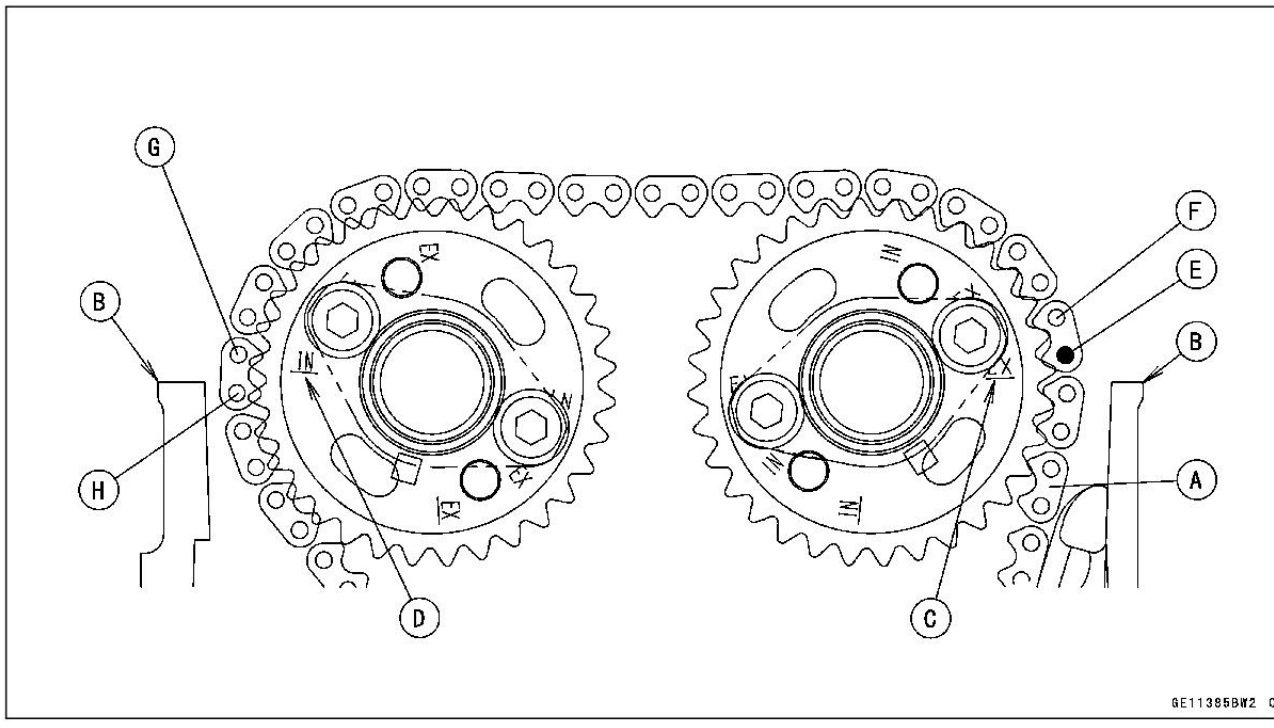
○Using a wrench on the starter clutch bolt [A], turn the crankshaft clockwise until the line [B] (TDC mark for #1,4 pistons) on the starter clutch [C] is aligned with the mating surface [D] of the crankcase.



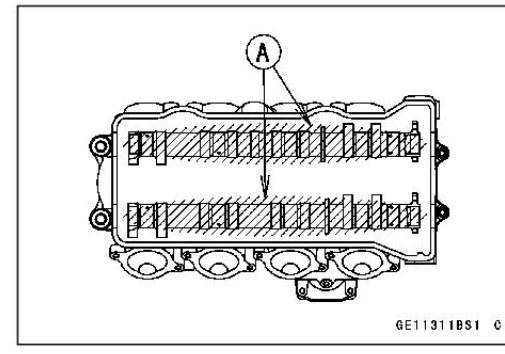
## Camshaft, Camshaft Chain

- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the sprockets so that timing marks on the sprockets are positioned as shown.

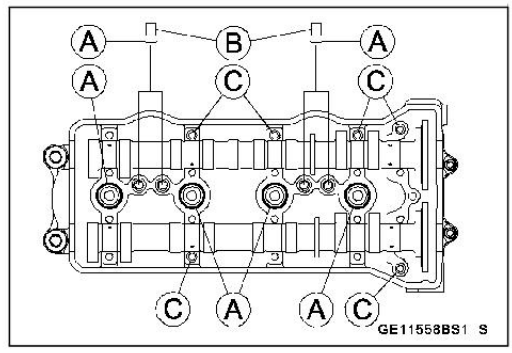
○The timing marks must be aligned with the cylinder head upper surface [B].
EX Mark [C]
IN Mark [D]
#1 Pin [E]
#2 Pin [F]
#27 Pin [G]
#28 Pin [H]




- Apply molybdenum disulfide oil solution [A] to all cam lobes, journals and thrust journals.



## Camshaft, Camshaft Chain

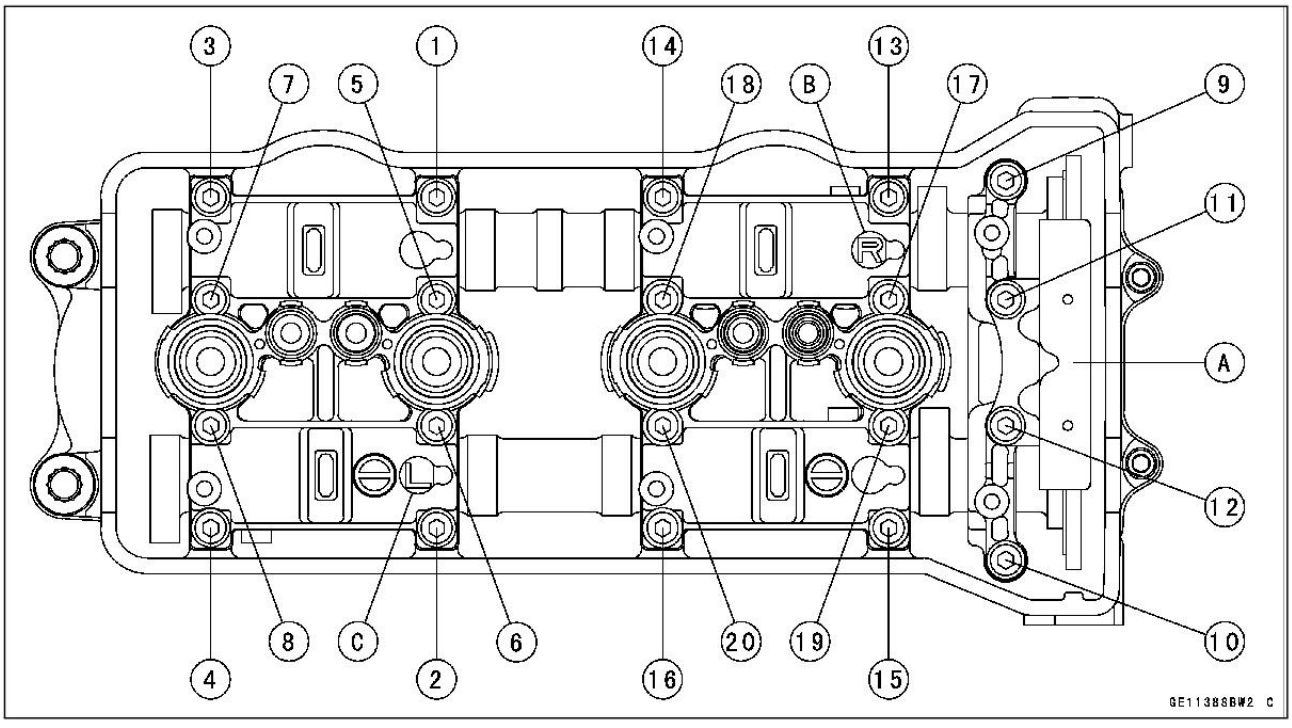



- Replace the O-rings [A] with new ones.
- Apply grease to the new O-rings
- Install:
  O-rings
  Dowel Pins [B]
  Dowel Pins [C]

- Install the camshaft caps and upper camshaft chain guide [A] as shown.
  "R" Mark [B]
  "L" Mark [C]
- Temporarily tighten the camshaft cap bolts following the specified sequence [1 – 20].

  **Torque - Camshaft Cap Bolts (First): 6.0 N·m (0.61 kgf·m, 53 in·lb)**
- Tighten the camshaft cap bolts with the specified torque by the same sequence.

  **Torque - Camshaft Cap Bolts (Final): 12 N·m (1.2 kgf·m, 106 in·lb)**



## Camshaft, Camshaft Chain

- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation(5-17)).
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.
- Replace the O-ring of the timing inspection cap and starter clutch bolt cap with new ones.
- Apply grease to the new O-rings.
- Tighten:

**Torque - Timing Inspection Cap: 3.0 N·m (0.31 kgf·m, 27 in·lb)**
**Starter Motor Clutch Bolt Cap: 3.0 N·m (0.31 kgf·m, 27 in·lb)**

- Install the cylinder head cover (see Cylinder Head Cover Installation(5-14)).

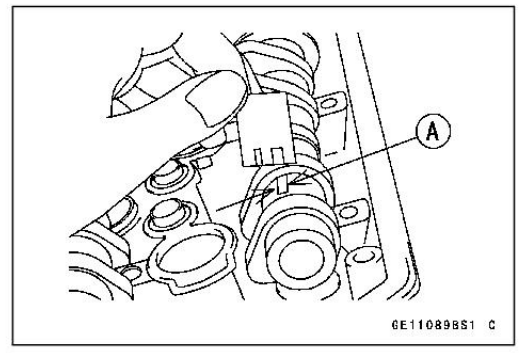
### *Camshaft, Camshaft Cap Wear Inspection*

- Remove the camshaft caps (see Camshaft Removal(5-18)).
- Cut the strips of plastigage (press gauge) to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Tighten the camshaft cap bolts to the specified torque (see Camshaft Installation(5-19)).

**NOTE**

○*Do not turn the camshaft when the plastigage is between the journal and camshaft cap.*

- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using plastigage [A].




**Camshaft Journal/Camshaft Cap Clearance**
**Standard: 0.038 – 0.081 mm (0.0015 – 0.0032 in.)**
**Service Limit: 0.17 mm (0.0067 in.)**

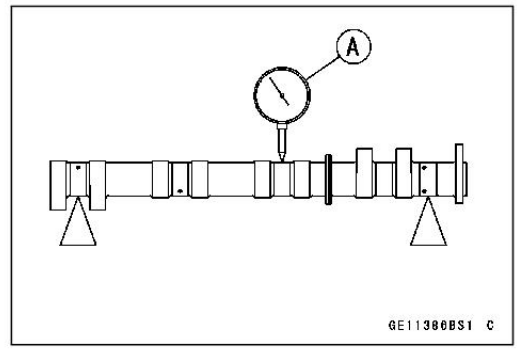
★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

**Camshaft Journal Diameter**
**Standard: 23.940 – 23.962 mm (0.94252 – 0.94338 in.)**
**Service Limit: 23.91 mm (0.9413 in.)**

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
★If the clearance still remains out of the service limit, replace the cylinder head unit.

## Camshaft, Camshaft Chain

### *Camshaft Runout Inspection*




- Remove the camshafts (see Camshaft Removal(5-18)).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge [A] at the specified place as shown.

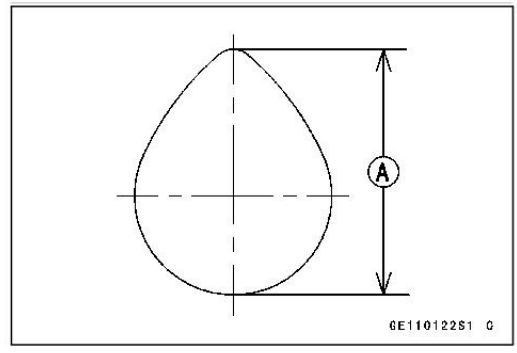
★If the runout exceeds the service limit, replace the camshaft.

**Camshaft Runout**

**Standard: TIR 0.02 mm (0.0008 in.) or less**

**Service Limit: TIR 0.1 mm (0.004 in.)**

### *Cam Wear Inspection*




- Remove the camshafts (see Camshaft Removal(5-18)).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

**Cam Height**

**Standard:**

**Exhaust 33.143 – 33.257 mm (1.3048 – 1.3093 in.)**

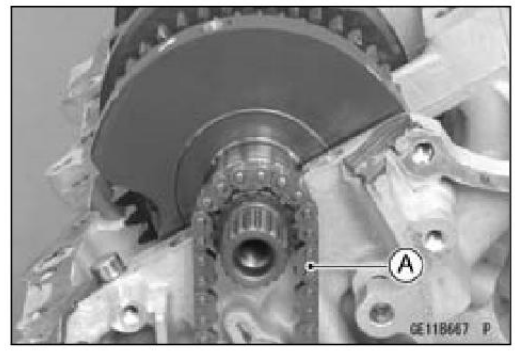
**Intake 34.543 – 34.657 mm (1.3600 – 1.3644 in.)**

**Service Limit:**

**Exhaust 33.24 mm (1.309 in.)**

**Intake 34.44 mm (1.356 in.)**

### *Camshaft Chain Removal*




- Split the crankcase (see Crankcase Splitting(9-11)).
- Remove the camshaft chain [A] from the crankshaft sprocket.

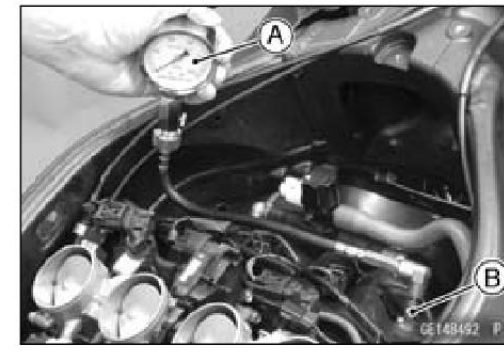
## Cylinder Head

### *Cylinder Compression Measurement*

**NOTE**

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly.
- Stop the engine.
- Remove the spark plugs (see Spark Plug Replacement(2-63)).




- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

**Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221**
**Compression Gauge Adapter, M10 × 1.0: 57001-1601**
**L-Shape Hose: 57001-1606**

**Cylinder Compression**
**Usable Range: 980 – 1 498 kPa (10.00 – 15.28 kgf/cm², 142 – 217.2 psi) @280 r/min (rpm)**

- Repeat the measurement for the other cylinders.
- Install the spark plugs (see Spark Plug Replacement(2-63)).

○The following table should be consulted if the obtainable compression reading is not within the usable range.

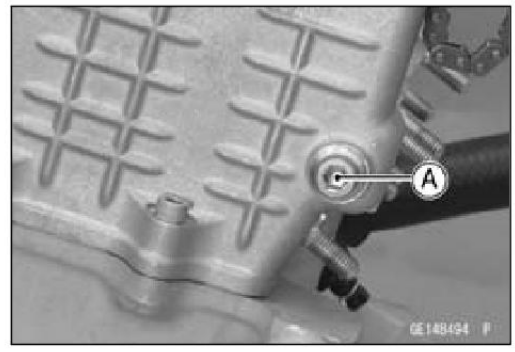
| Problem | Diagnosis | Remedy (Action) |
|---|---|---|
| Cylinder compression is higher than usable range. | Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke). | Remove the carbon deposits and replace damaged parts if necessary. |
| | Incorrect cylinder head gasket thickness | Replace the gasket with a standard part. |
| Cylinder compression is lower than usable range. | Gas leakage around cylinder head | Replace damaged gasket and check cylinder head warp. |
| | Bad condition of valve seating | Repair if necessary. |
| | Incorrect valve clearance | Adjust the valve clearance. |
| | Incorrect piston/cylinder clearance | Replace the piston and/or cylinder. |
| | Piston seizure | Inspect the cylinder and replace/repair the cylinder and/or piston as necessary. |
| | Bad condition of piston ring and/or piston ring grooves | Replace the piston and/or the piston rings. |

### *Cylinder Head Removal*

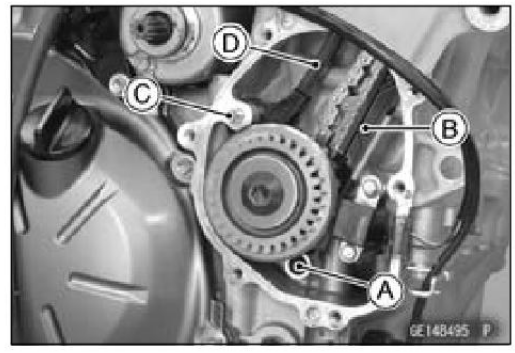
- Remove:
  Engine (see Engine Removal(8-5))
  Thermostat Housing (see Thermostat Removal(4-16))
  Cylinder Head Cover (see Cylinder Head Cover Removal(5-14))
  Camshafts (see Camshaft Removal(5-18))

## Cylinder Head

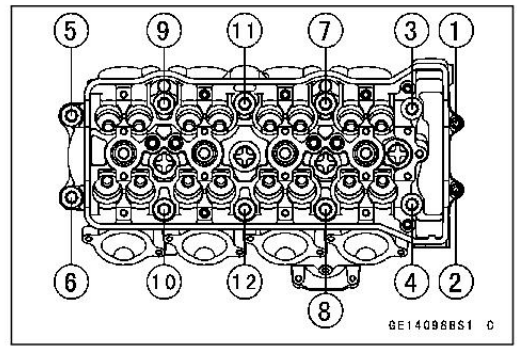
● Remove the front camshaft chain guide bolt (upper) [A].




● Remove:
Starter Idle Gear (see Starter Idle Gear Removal(9-32))
Front Camshaft Chain Guide Bolt (Lower) [A]
Collar
Front Camshaft Chain Guide [B]
Dowel Pin [C]
Rear Camshaft Chain Guide [D]




● Loosen the M6 and M9 cylinder head bolts as shown sequence [1 – 12], and remove them with washers.
● Remove the cylinder head.

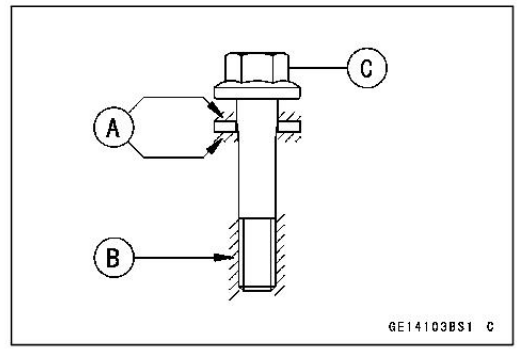



### *Cylinder Head Installation*

**NOTE**

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

● Install the dowel pins.
● Replace the cylinder head gasket with a new one.
● Replace the cylinder head bolt washers with new ones.
● Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers and the threads [B] of the head bolts [C].

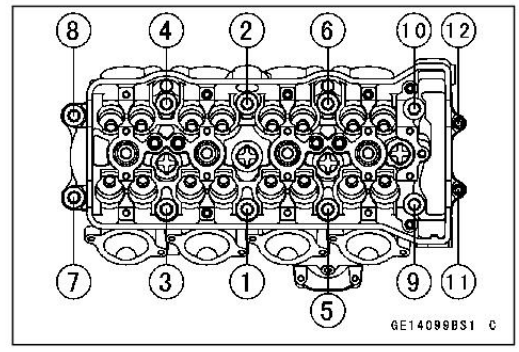


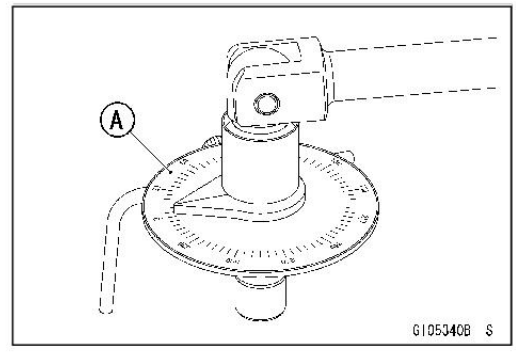
## Cylinder Head

● Tighten the M9 cylinder head bolts following the tightening sequence [1 –10].

○First, tighten the bolts with **12 N·m (1.2 kgf·m, 106 in·lb)** of torque.

○Next, in accordance with the following table tighten the bolts with the specified torque. And using a torque angle gauge [A], tighten the bolts with the specified angle.




**New Bolt**

| Order | Cylinder Head Bolts (M9) | Torque N·m (kgf·m, ft·lb) | Angle |
|---|---|---|---|
| 1 | [1] → [2] | 35 (3.6, 26) | |
| 2 | [1] → [2] | | 50° ±3 |
| 3 | [3] → [4] | 35 (3.6, 26) | |
| 4 | [3] → [4] | | 50° ±3 |
| 5 | [5] → [6] | 35 (3.6, 26) | |
| 6 | [5] → [6] | | 50° ±3 |
| 7 | [7] → [8] | 30 (3.1, 22) | |
| 8 | [7] → [8] | | 50° ±3 |
| 9 | [9] → [10] | 35 (3.6, 26) | |
| 10 | [9] → [10] | | 50° ±3 |

**Used Bolt**

| Order | Cylinder Head Bolts (M9) | Torque N·m (kgf·m, ft·lb) | Angle |
|---|---|---|---|
| 1 | [1] → [2] | 33 (3.4, 24) | |
| 2 | [1] → [2] | | 50° ±3 |
| 3 | [3] → [4] | 33 (3.4, 24) | |
| 4 | [3] → [4] | | 50° ±3 |
| 5 | [5] → [6] | 33 (3.4, 24) | |
| 6 | [5] → [6] | | 50° ±3 |
| 7 | [7] → [8] | 28 (2.9, 21) | |
| 8 | [7] → [8] | | 50° ±3 |
| 9 | [9] → [10] | 33 (3.4, 24) | |
| 10 | [9] → [10] | | 50° ±3 |

● Tighten the M6 cylinder head bolts as shown sequence [11, 12].

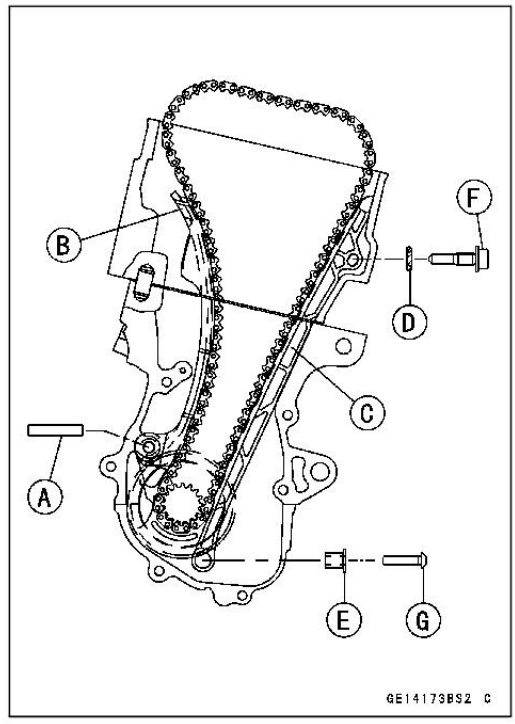
**Torque - Cylinder Head Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)**

## Cylinder Head

- Replace the o-ring with a new one.
- Install:
  Dowel Pin [A]
  Rear Camshaft Chain Guide [B]
  Front Camshaft Chain Guide [C]
  O-ring [D]
  Collar [E]
- Tighten:

**Torque - Front Camshaft Chain Guide Bolt (Upper) [F]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Front Camshaft Chain Guide Bolt (Lower) [G]: 12 N·m (1.2 kgf·m, 106 in·lb)**

- Install the removed parts.



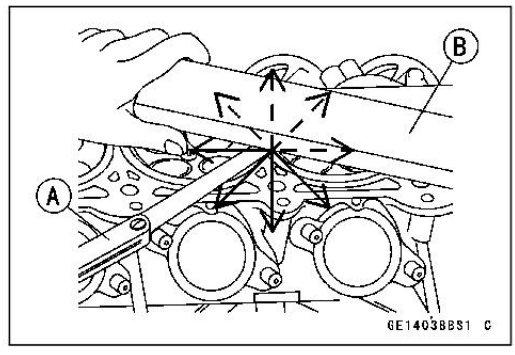

### *Cylinder Head Warp Inspection*

- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

**Cylinder Head Warp**
**Standard: – – –**
**Service Limit: 0.05 mm (0.002 in.)**

★If the cylinder head is warped more than the service limit, replace it.

★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).



## Valves

### *Valve Clearance Inspection*

- Refer to the Valve Clearance Inspection (see Valve Clearance Inspection(2-31)).

### *Valve Clearance Adjustment*

- Refer to the Valve Clearance Adjustment (see Valve Clearance Adjustment(2-32)).

### *Valve Removal*

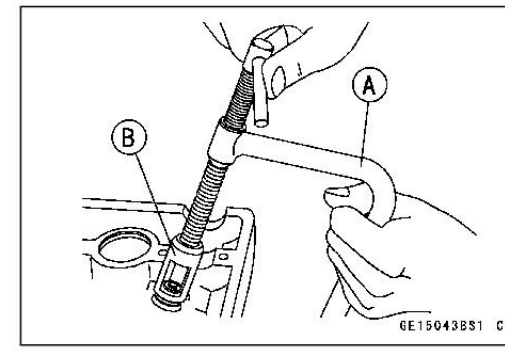
- Remove the cylinder head (see Cylinder Head Removal(5-25)).
- Remove the valve lifter and shim.

**NOTE**

○*Mark and record the valve lifter and shim locations so they can be installed in their original positions.*

- Using the valve spring compressor assembly, remove the valve.

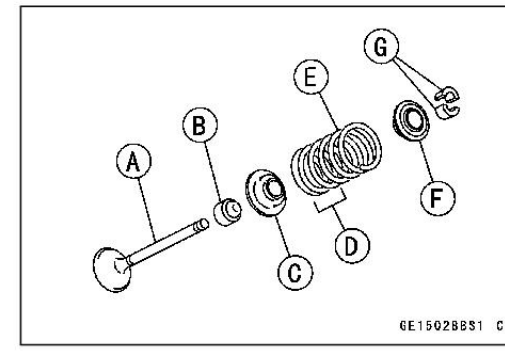
**Special Tools - Valve Spring Compressor Assembly [A]: 57001-241**
**Valve Spring Compressor Adapter, ϕ20 [B]: 57001-1154**




### *Valve Installation*

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Install the springs so that the closed coil end faces downwards.

Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Closed Coil End [D]
Valve Spring [E]:
EX - Yellow Paint
IN - Blue Paint
Retainer [F]
Split Keepers [G]




### *Valve Guide Removal*

- Remove:

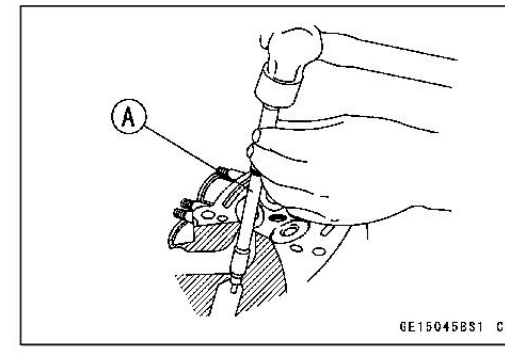
Valve (see Valve Removal(5-29))
Oil Seal
Spring Seat

- Heat the area around the valve guide to 120 – 150°C (248 – 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

***NOTICE***

**Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.**

**Special Tool - Valve Guide Arbor, ϕ4: 57001-1273**



## Valves

### *Valve Guide Installation*

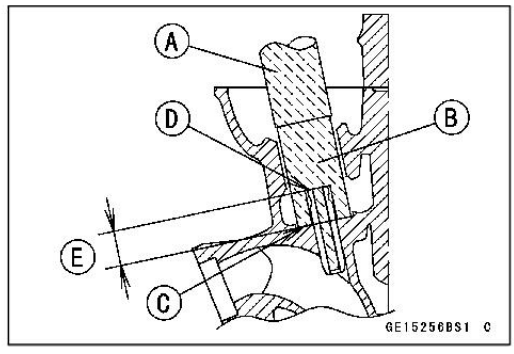
- Apply engine oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 – 150°C (248 – 302°F).

| *NOTICE* |
| --- |
| **Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head and heat the oil.** |

**Exhaust**

- Using the valve guide driver [A] and attachment [B], press and insert the valve guide in until the attachment surface [C] touches the head surface [D].
  13.3 – 13.5 mm (0.52 – 0.53 in.) [E]

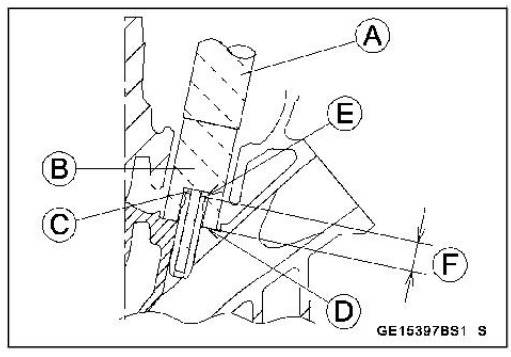
**Special Tools - Valve Guide Driver: 57001-1564**
**Valve Guide Driver Attachment, C: 57001 -1624**




**Intake**

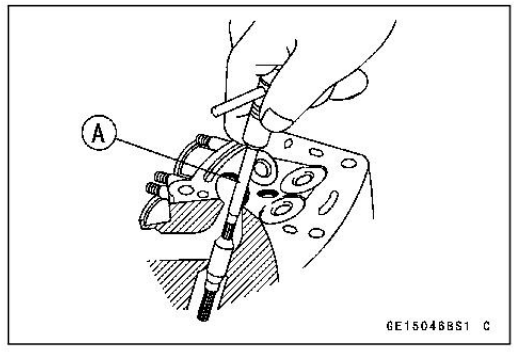
- Using the valve guide driver [A], attachment [B] and spacer [C], press and insert the valve guide in until the attachment surface [D] touches the head surface [E].
  12.6 – 12.8 mm (0.496 – 0.504 in.) [F]

**Special Tools - Valve Guide Driver: 57001-1564**
**Valve Guide Driver Attachment, C: 57001 -1624**
**Spacer: 57001-1786**




- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

**Special Tool - Valve Guide Reamer, $\phi$4: 57001-1274**

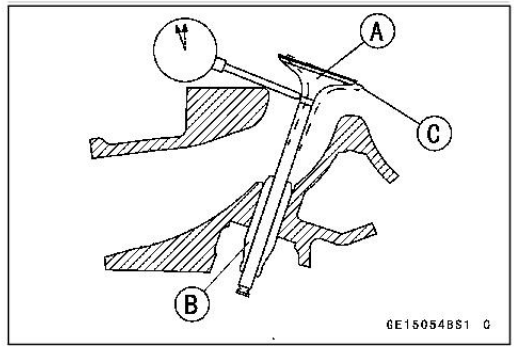



### *Valve-to-Guide Clearance Measurement (Wobble Method)*

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the valve guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the valve guide.



## Valves

**NOTE**

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

**Valve/Valve Guide Clearance (Wobble Method)**
**Standard:**
**Exhaust 0.09 – 0.17 mm (0.0035 – 0.0067 in.)**
**Intake 0.03 – 0.11 mm (0.0012 – 0.0043 in.)**
**Service Limit:**
**Exhaust 0.37 mm (0.015 in.)**
**Intake 0.31 mm (0.012 in.)**

### *Valve Seat Inspection*

- Remove the valve (see Valve Removal(5-29)).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

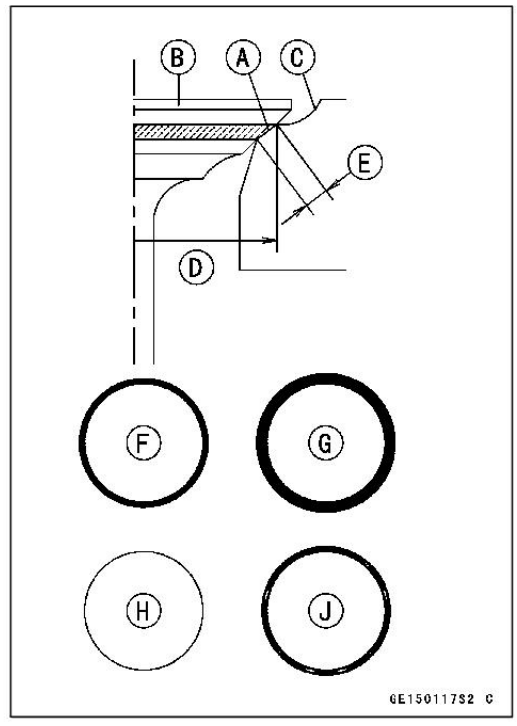
★If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair(5-31)).

**Valve Seating Surface Outside Diameter**
**Standard:**
**Exhaust 22.8 – 23.0 mm (0.90 – 0.91 in.)**
**Intake 26.9 – 27.1 mm (1.06 – 1.07 in.)**

○Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.
Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair(5-31)).

**Valve Seating Surface Width**
**Standard:**
**Exhaust 0.8 – 1.2 mm (0.031 – 0.047 in.)**
**Intake 0.5 – 1.0 mm (0.020 – 0.039 in.)**




### *Valve Seat Repair*

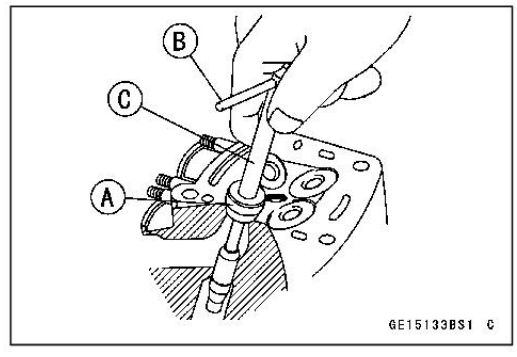
- Repair the valve seat with the valve seat cutters [A].

**Special Tools - Valve Seat Cutter Holder Bar [B]: 57001-1128**
**Valve Seat Cutter Holder, $\phi$4 [C]: 57001-1275**

**[For Exhaust Valve Seat]**
**Valve Seat Cutter, 45° - $\phi$24.5: 57001-1113**
**Valve Seat Cutter, 32° - $\phi$25: 57001-1118**
**Valve Seat Cutter, 60° - $\phi$25: 57001-1328**

**[For Intake Valve Seat]**
**Valve Seat Cutter, 45° - $\phi$30: 57001-1187**
**Valve Seat Cutter, 32° - $\phi$30: 57001-1120**
**Valve Seat Cutter, 60° - $\phi$27: 57001-1409**

★If the manufacturer's instructions are not available, use the following procedure.



## Valves

### Seat Cutter Operation Care

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

| *NOTICE* |
| --- |
| **Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.** |

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

**NOTE**

○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

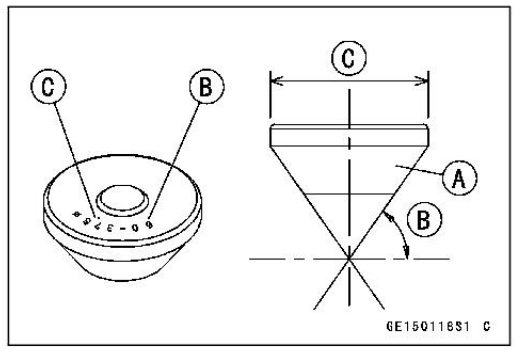
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

### Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

37.5$\phi$ ..... Outer diameter of cutter [C]




### Operating Procedures

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

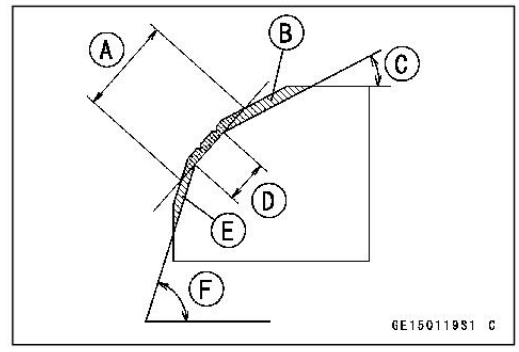
| *NOTICE* |
| --- |
| **Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.** |

## Valves

● Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]




● Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° [A] grind until the diameter is within the specified range.

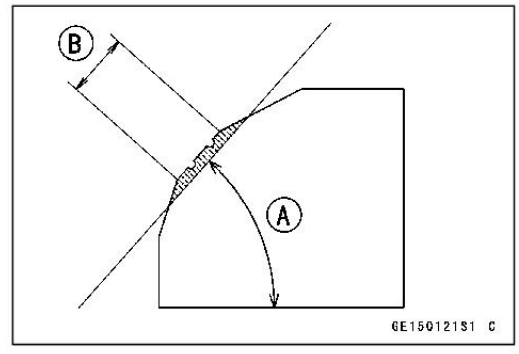
Original Seating Surface [B]

**NOTE**

○*Remove all pittings of flaws from 45° ground surface.*

○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.*

○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*



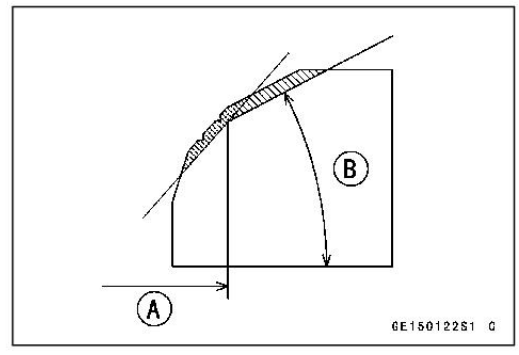

★If the outside diameter [A] of the seating surface is too large, make the 32° [B] grind described below.

★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.

● Grind the seat at a 32° angle until the seat outside diameter is within the specified range.

○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.

○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.




***NOTICE***

**The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.**

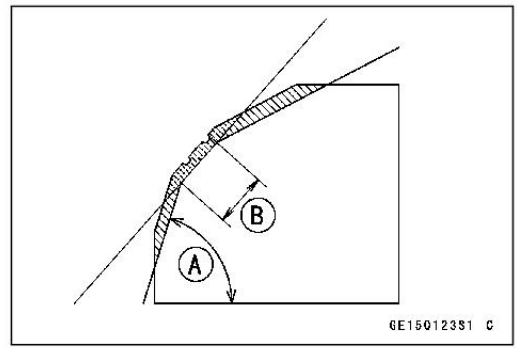
○After making the 32° grind, return to the seat outside diameter measurement step above.

● To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.

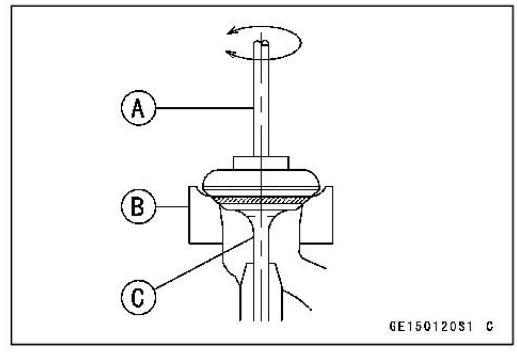
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

## Valves

★If the seat width is too wide, make the 60° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
● Grind the seat at a 60° angle until the seat width is within the specified range.
○To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 60° grind, return to the seat width measurement step above.
Correct Width [B]

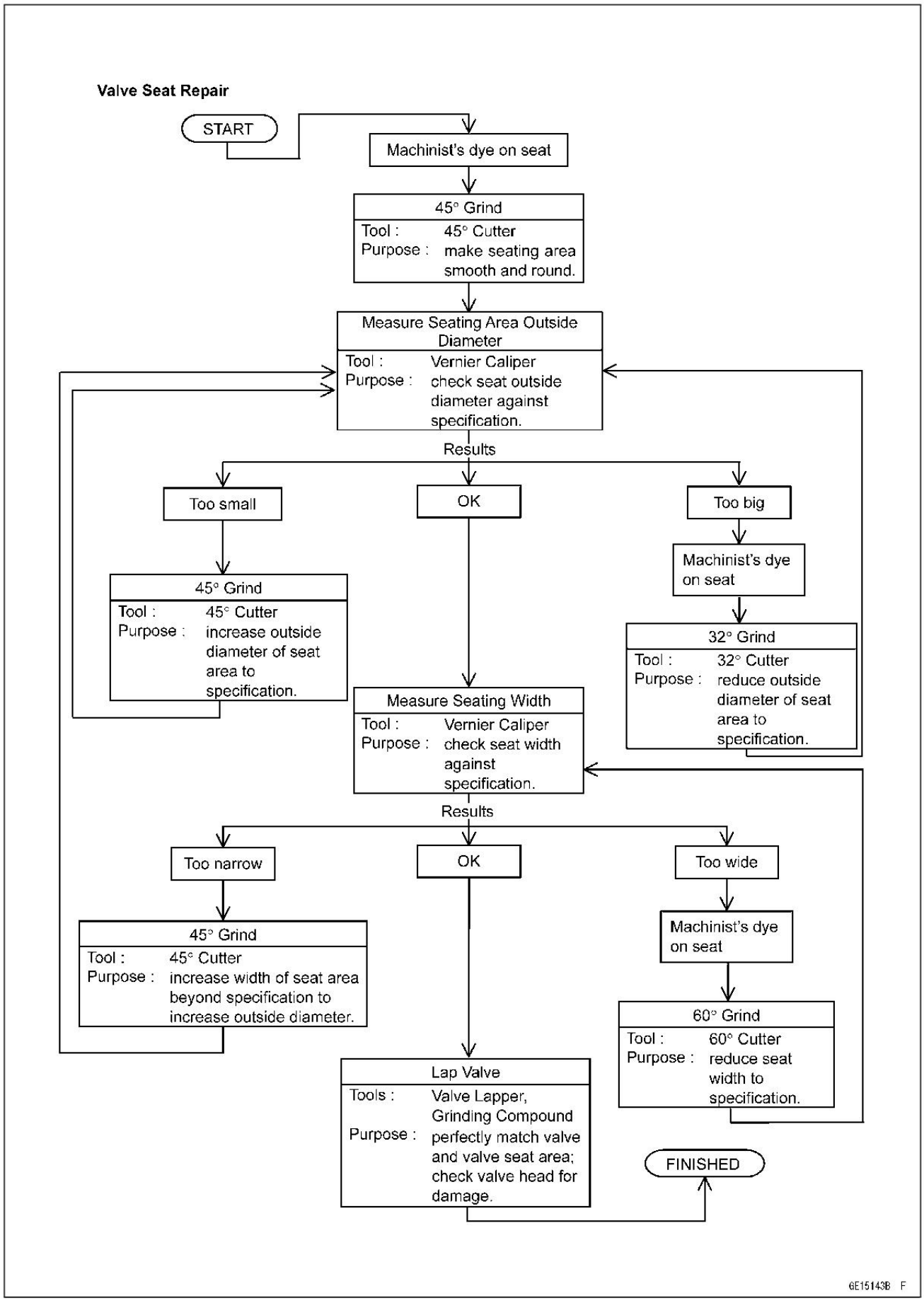



● Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
Lapper [A]
Valve Seat [B]
Valve [C]




● The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Inspection(2-31)).

## Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool : 45° Cutter
Purpose : make seating area smooth and round.
Measure Seating Area Outside Diameter
Tool : Vernier Caliper
Purpose : check seat outside diameter against specification.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase outside diameter of seat area to specification.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce outside diameter of seat area to specification.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against specification.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond specification to increase outside diameter.
Machinist's dye on seat
60° Grind
Tool : 60° Cutter
Purpose : reduce seat width to specification.
Lap Valve
Tools : Valve Lapper, Grinding Compound
Purpose : perfectly match valve and valve seat area; check valve head for damage.
FINISHED
6E15143B F

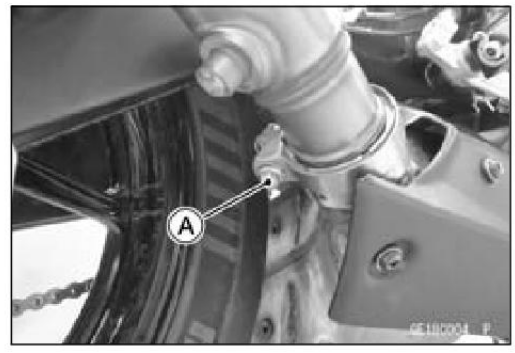
## Muffler

**⚠ WARNING**

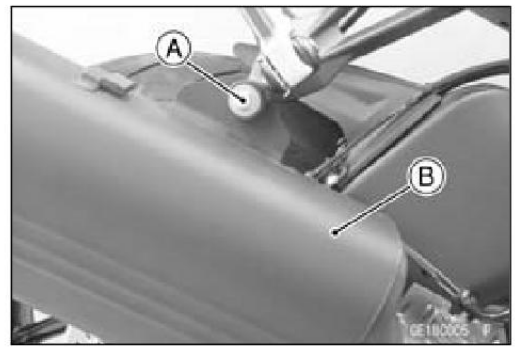
**The muffler can become extremely hot during normal operation and cause severe burns. Do not remove the muffler while it is hot.**

### *Muffler Body Removal*

- Remove the lower ends of the exhaust butterfly valve cables from the pulley of the muffler body (see Exhaust Butterfly Valve Cable Removal(5-42)).
- Loosen the muffler body clamp bolt [A].




- Remove the muffler body bolt [A], and pull out the muffler body [B] backward from the premuffler chamber.



## Muffler

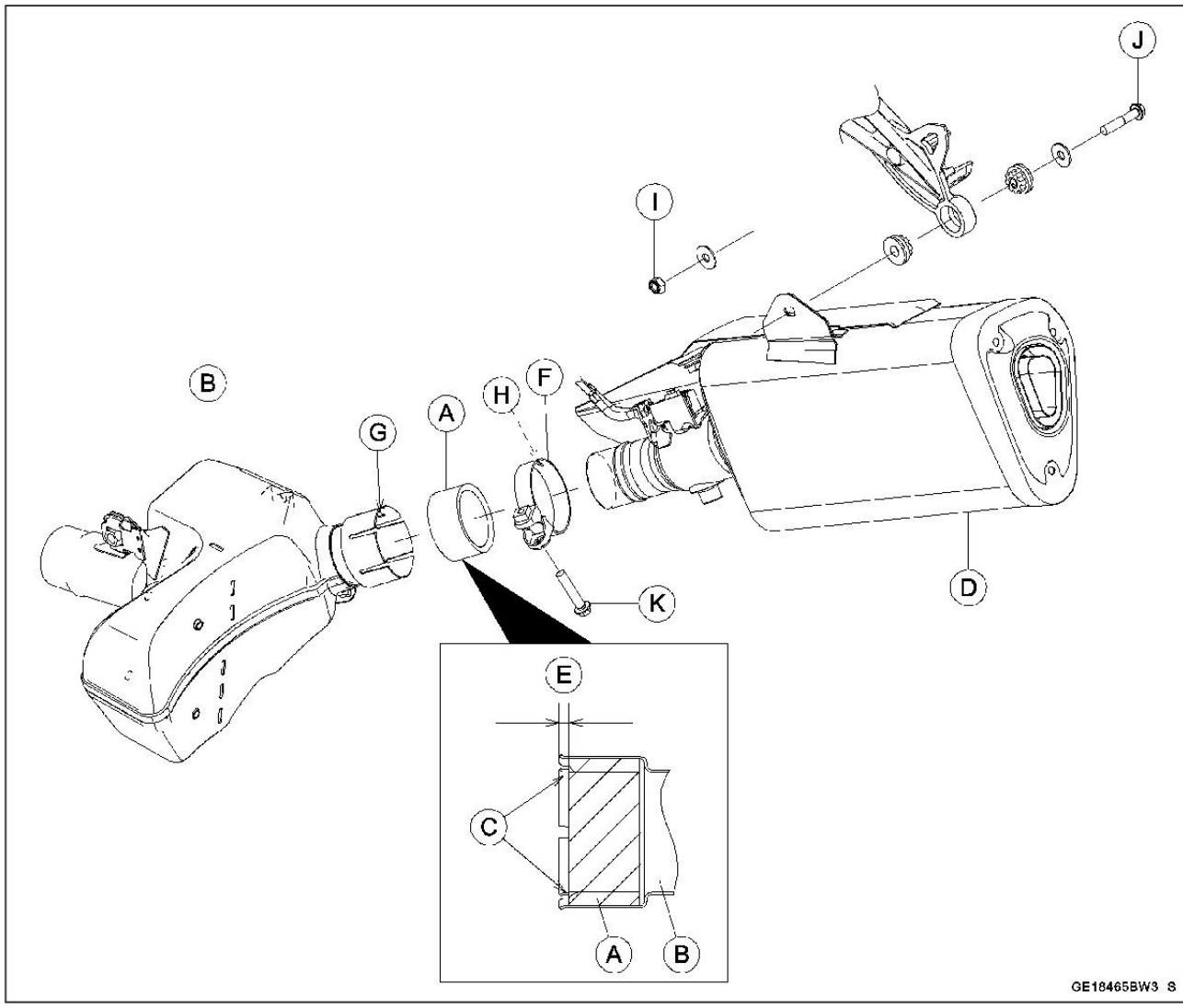
### *Muffler Body Installation*

- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket to the premuffler chamber [B] until it is bottomed so that the chamfer side [C] faces muffler body [D].
  About 4.0 mm (0.16 in.) [E]
- Install the muffler body clamp [F] as shown.

○Insert the projection [G] into the slot [H].

- Replace the muffler body nut [I] with a new one.
- Install the muffler body.
- Tighten:

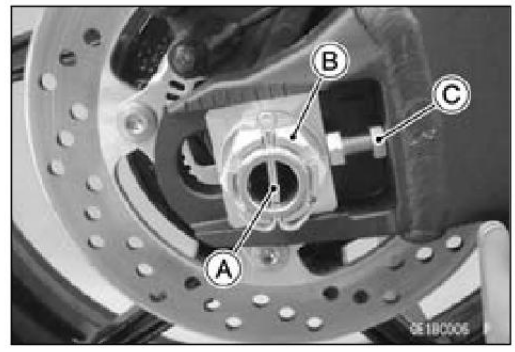
**Torque - Muffler Body Bolt [J]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Muffler Body Clamp Bolt [K]: 20 N·m (2.0 kgf·m, 15 ft·lb)**



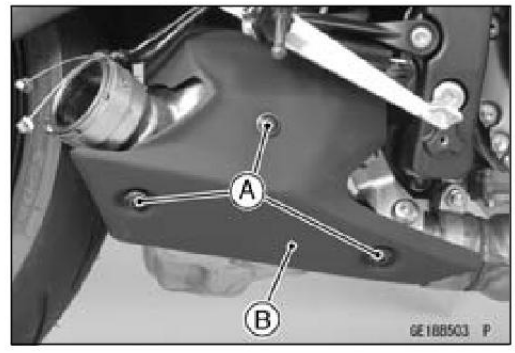

- Install the lower ends of the exhaust butterfly valve cables, and adjust the cables correctly (see Exhaust Butterfly Valve Cable Installation(5-43)).
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.

## Muffler

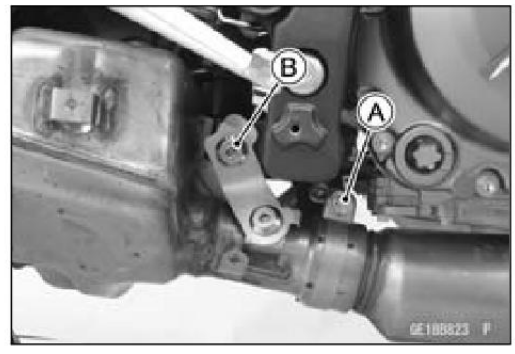
### *Premuffler Chamber Removal*




- Remove:
  Muffler Body (see Muffler Body Removal(5-36))
  Cotter Pin [A]
- Disconnect the rear oxygen sensor connector (Equipped Models) (see Rear Oxygen Sensor Removal(17-119)).
- Loosen the rear axle nut [B].
- Loosen the both chain adjuster locknuts [C] (Both Sides).
- Remove the drive chain from the rear sprocket.
- Pull the rear wheel backward.




- Remove:
  Guard Bolts [A]
  Premuffler Chamber Guard [B]




- Loosen the exhaust pipe clamp bolt [A].
- Remove the bolt [B].
- Pull out the premuffler chamber backward from the exhaust pipe.

## Muffler

### *Premuffler Chamber Installation*

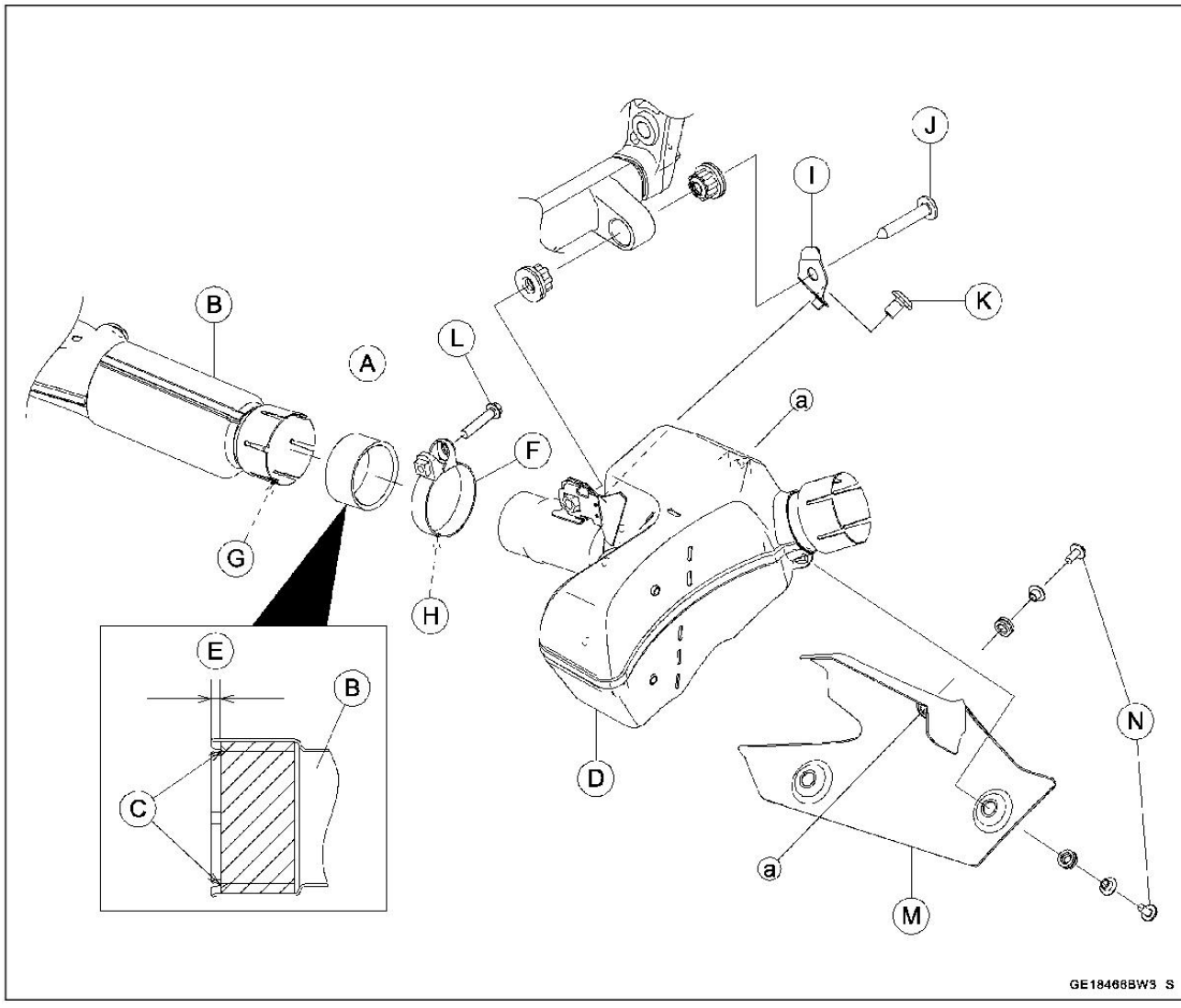
- Replace the premuffler chamber gasket [A] with a new one.
- Install the premuffler chamber gasket to the exhaust pipe [B] until it is bottomed so that the chamfer side [C] faces premuffler chamber [D].
  About 4.0 mm (0.16 in.) [E]
- Install the exhaust pipe clamp [F] as shown.

○Insert the projection [G] into the slot [H].

- Install the premuffler chamber and bracket [I].
- Tighten:

**Torque - Premuffler Chamber Bolt [J]: 40 N·m (4.1 kgf·m, 30 ft·lb)**
**Premuffler Chamber Bracket Bolt [K]: 40 N·m (4.1 kgf·m, 30 ft·lb)**
**Exhaust Pipe Clamp Bolt [L]: 20 N·m (2.0 kgf·m, 15 ft·lb)**

- Connect the rear oxygen sensor connector (Equipped Models) (see Rear Oxygen Sensor Installation(17-119)).
- Install the premuffler chamber guard [M], and tighten the guard bolt [N].

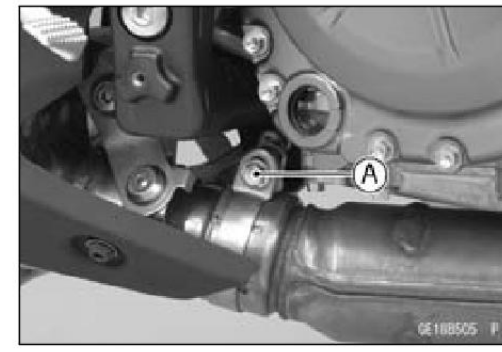



- Install the removed parts.
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.

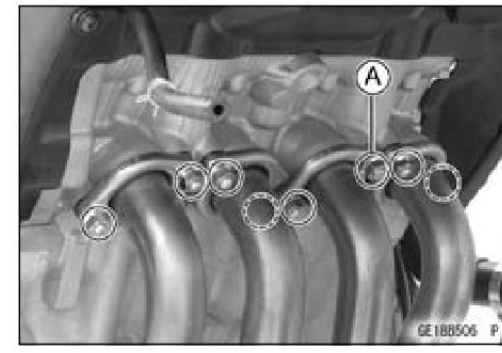
## Muffler

### *Exhaust Pipe Removal*

- Remove:
  Radiator (see Radiator and Radiator Fan Removal(4-12))
  Front Oxygen Sensor (see Front Oxygen Sensor Removal(17-93))
  Exhaust Pipe Clamp Bolt [A]




- Remove the exhaust pipe holder nuts [A], and pull out the exhaust pipe forward from the premuffler chamber.



## Muffler

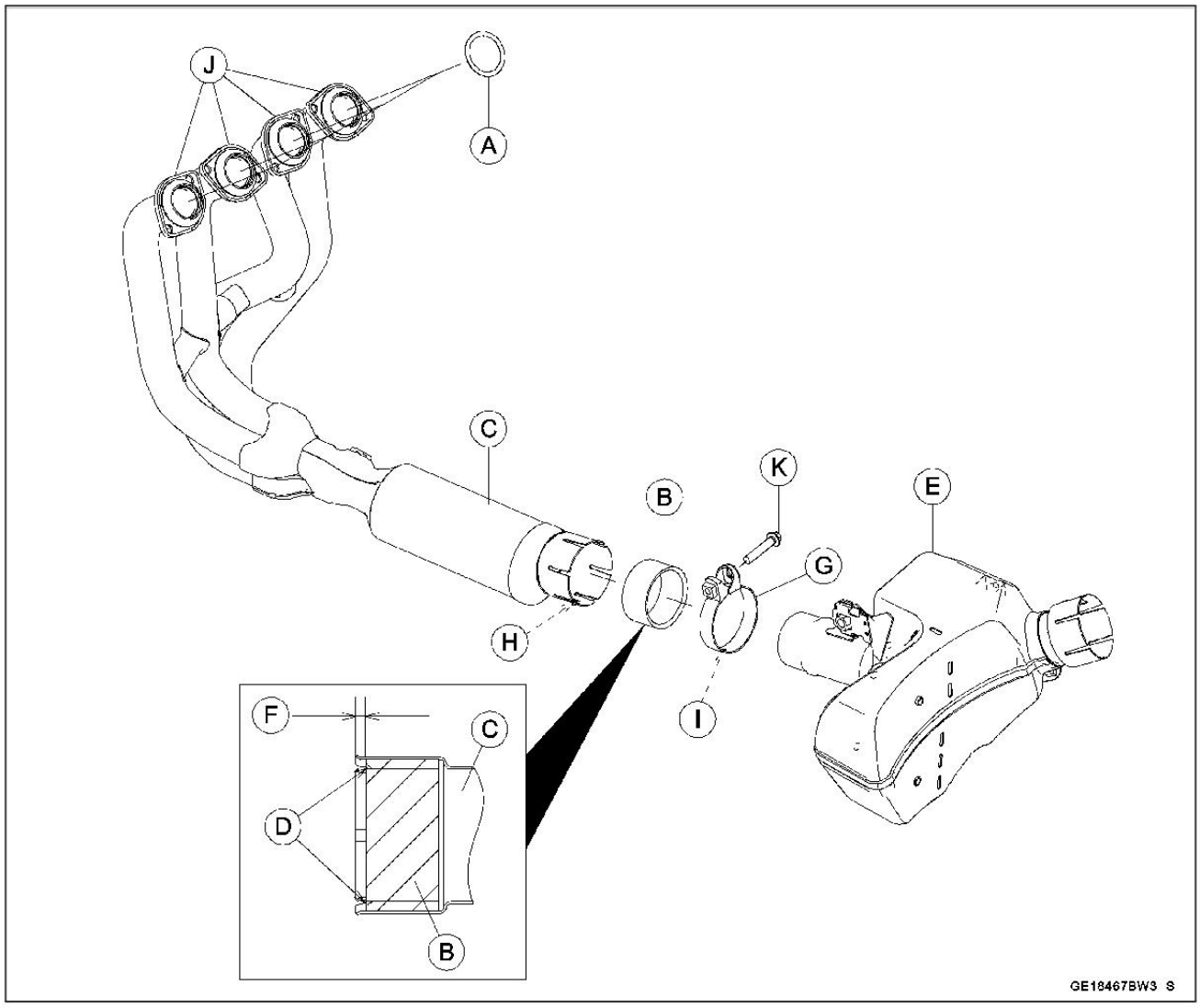
### *Exhaust Pipe Installation*

- Replace the exhaust pipe gaskets [A] and premuffler chamber gasket [B] with new ones.
- Apply grease to the exhaust pipe gaskets and install them.
- Install the premuffler chamber gasket to the exhaust pipe [C] until it is bottomed so that the chamfer side [D] faces premuffler chamber [E].
  About 4.0 mm (0.16 in.) [F]
- Install the exhaust pipe clamp [G] as shown.

○Insert the projection [H] into the slot [I].

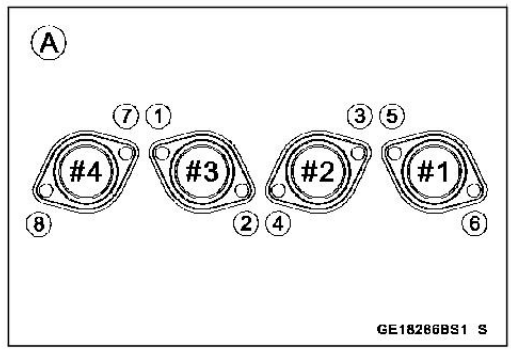
- Install the exhaust pipe.
- Turn the [UP] mark to the top of the exhaust pipe holders [J].
- Tighten:

**Torque - Exhaust Pipe Clamp Bolt [K]: 20 N·m (2.0 kgf·m, 15 ft·lb)**



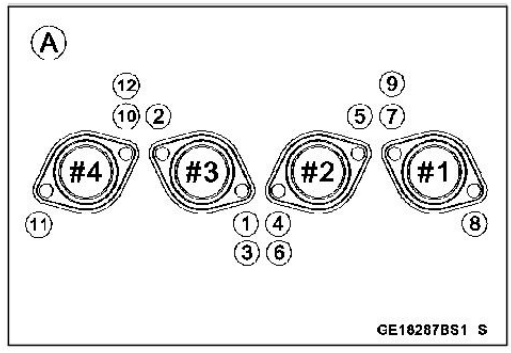
## Muffler

- Temporarily tighten the exhaust pipe holder nuts following the tightening sequence [1 – 8].
  View from Front [A]




- Tighten the exhaust pipe holder nuts following the specified tightening sequence [1 – 12].
  View from Front [A]

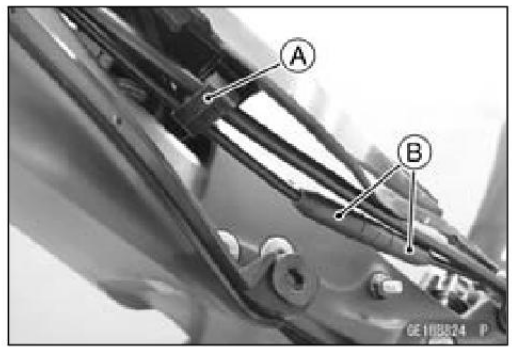
  **Torque - Exhaust Pipe Holder Nuts: 20 N·m (2.0 kgf·m, 15 ft·lb)**



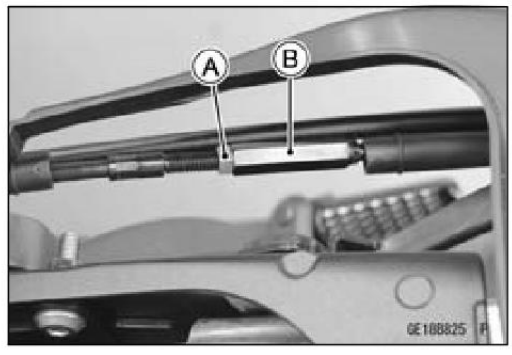

- Install the removed parts.
- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts and nuts.

### *Exhaust Butterfly Valve Cable Removal*

- Remove the right seat cover (see Seat Cover Removal(15-22)).
- Open the clamp [A] and free the cables.
- Slide the dust cover [B].

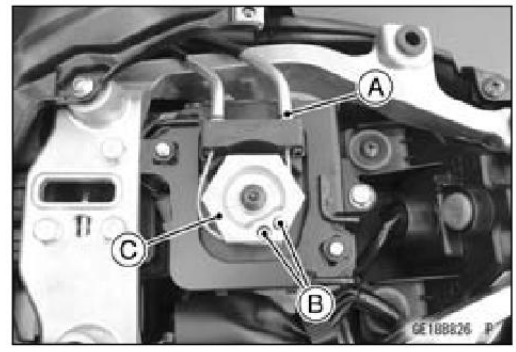



- Loosen the locknut [A], and turn the adjuster [B] to give the cable plenty of play.

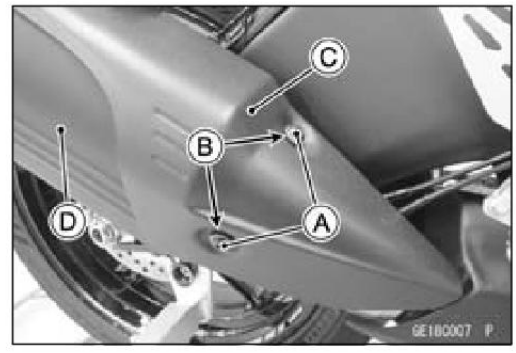


## Muffler

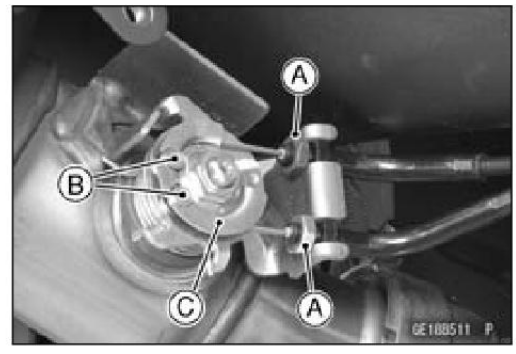
- Remove the clamp [A].
- Remove the upper ends [B] of the exhaust butterfly valve cables from the pulley [C].




- Remove:
  Bolts [A]
  Collar [B]
- Remove the muffler body cover [C] forward from the muffler body [D].




- Loosen the locknuts [A].
- Remove the lower ends [B] of the exhaust butterfly valve cables from the pulley [C].
- Pull the exhaust butterfly valve cables out of the frame.



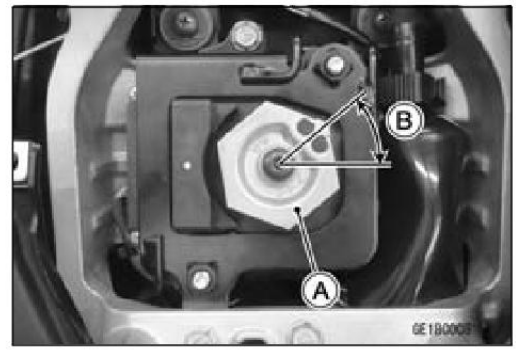

### *Exhaust Butterfly Valve Cable Installation*

- Confirm whether pulley [A] is an angle shown.
  41.7° ±7° [B]

○This position is original position of the pulley.

**NOTE**

○*Correct the position electrically after confirming use is discontinued and there is no damage when differing from the angle of shown.*



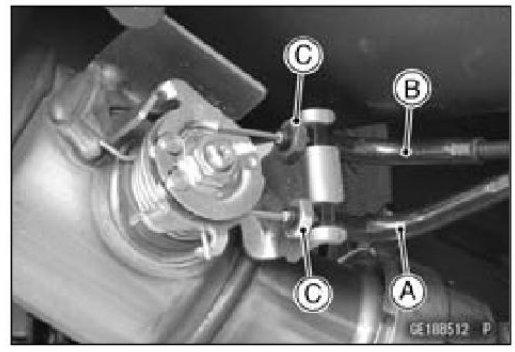

| *NOTICE* |
| --- |
| **Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.** |

★If the angle is wrong, adjust the pulley (see Exhaust Butterfly Valve Actuator Installation(5-47)).

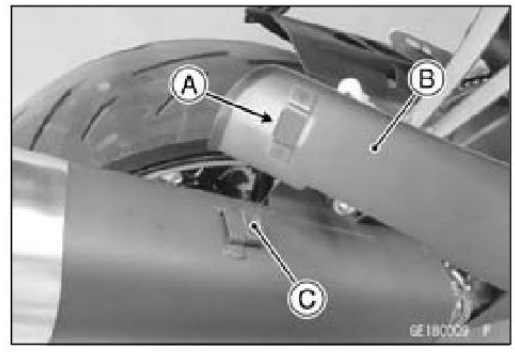
## Muffler

- Run the exhaust butterfly valve cables correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the lower ends of the exhaust butterfly valve cables to the pulley of the muffler body as shown.
  Open Cable [A] (White Locknut)
  Close Cable [B] (Black Locknut)
- Tighten:

**Torque - Exhaust Butterfly Valve Cable Locknuts [C]: 5.0 N·m (0.51 kgf·m, 44 in·lb)**




- Fit the slot [A] of the muffler cover [B] to the damper [C] of the muffler body, and tighten the bolts.

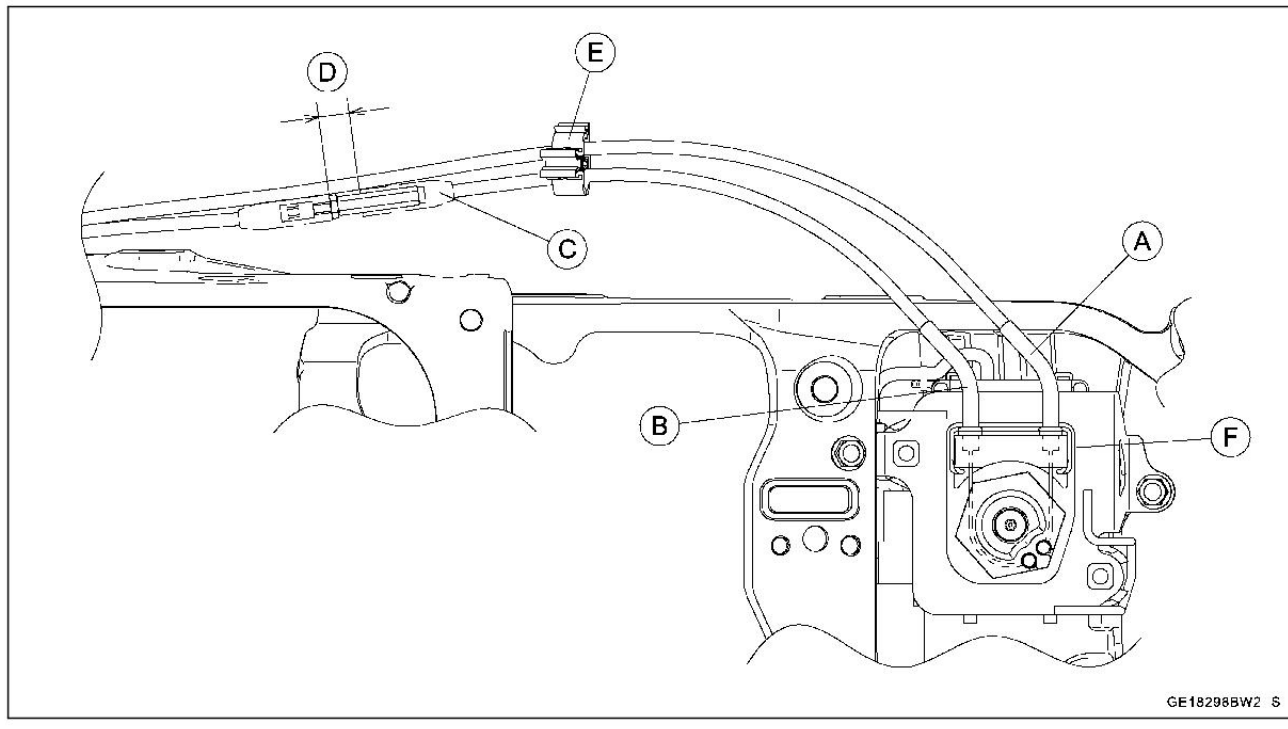


## Muffler

- Install the upper ends of the exhaust butterfly valve cables to the pulley of the exhaust butterfly valve actuator, following the specified installing sequence.

○First, install the close cable (black) [A].
○Second, install the open cable (white) [B].
○Third, stretch the open cable (white) by using the adjuster [C].
○Turn the adjuster counterclockwise until the play of the open cable becomes no play.
○Fourth, turn the adjuster of the open cable clockwise by 1/2 to 1 rotation.
○Lastly, tighten the adjuster locknut of the open cable securely.

- After installation, cover the dust cover on the adjuster as shown.
  15 mm (0.59 in.) or less [D]
- Fix the exhaust butterfly valve cables with the clamps [E] [F].
- After connecting the cables, turn the ignition switch on and make sure that the pulley turns clockwise and counterclockwise, then it returns clockwise slightly.

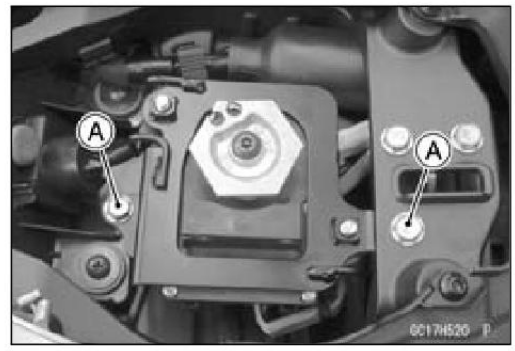


## Muffler

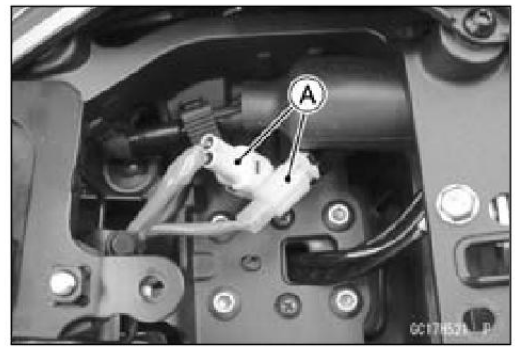
### *Exhaust Butterfly Valve Actuator Removal*

| *NOTICE* |
| --- |
| **Never drop the exhaust butterfly valve actuator especially on a hard surface. Such a shock to the actuator can damage it.** |

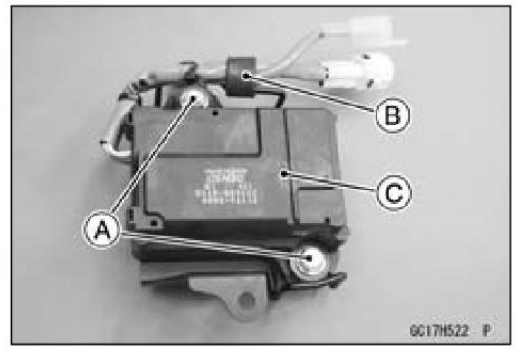
- Disconnect the exhaust butterfly valve cable upper ends (see Exhaust Butterfly Valve Cable Removal(5-42)).
- Remove the bolts [A].




- Disconnect the connectors [A].



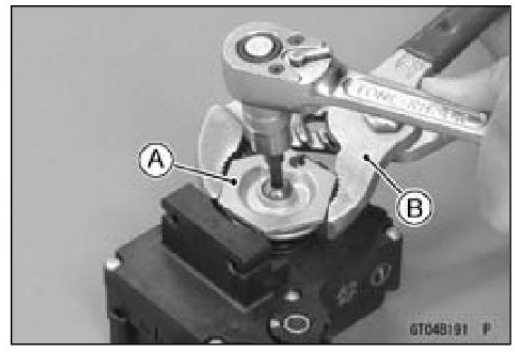

- Remove:
  Bolts [A] and Washers
  Band [B]
  Exhaust Butterfly Valve Actuator [C]




- Remove the pulley bolt while holding the pulley [A] with a suitable tool [B].

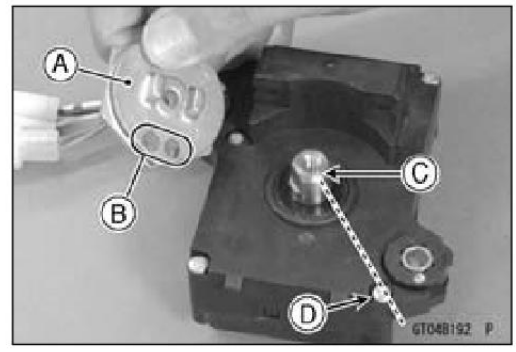
| *NOTICE* |
| --- |
| **If the pulley bolt is removed without holding, the actuator damage will occur.** |

- Remove the pulley from the actuator.



## Muffler

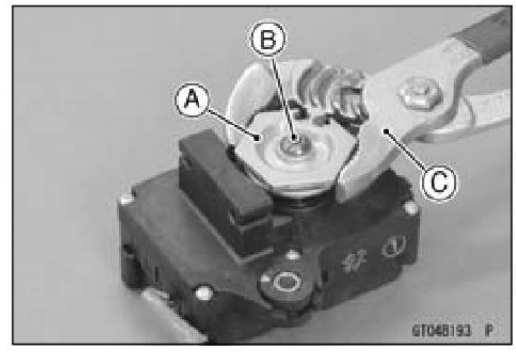
### *Exhaust Butterfly Valve Actuator Installation*




- Install the pulley [A] on the actuator so that the hole side [B] align with the groove [C] on the shaft.

○Make sure that the groove on the shaft is pointing toward the center of the screw [D].

○If the shaft position is incorrect, refer to the following NOTE and procedures to electrically adjust the shaft position.




- Install the pulley [A] on the actuator as shown.
- Tighten the pulley bolt [B] while holding the pulley with the suitable tool [C].

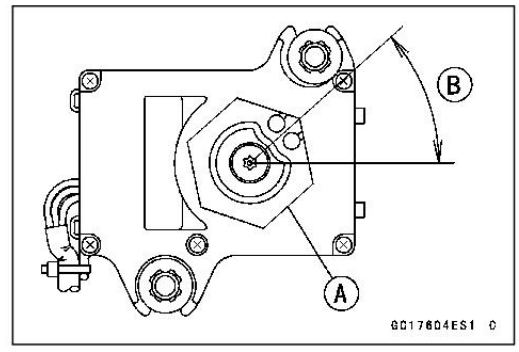
**Torque - Exhaust Butterfly Valve Actuator Pulley Bolt: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

| *NOTICE* |
| --- |
| **If the pulley bolt is tightened without holding, the actuator damage will occur.** |

- After tightening the pulley bolt, confirm whether pulley [A] is an angle as shown.

41.7° ±7° [B]

○This position is original position of the pulley.




**NOTE**

○*Correct the position electrically after confirming the use is discontinued and there is no damage when differing from the angle as shown.*

| *NOTICE* |
| --- |
| **Do not correct the pulley position with the tool, forcibly. The actuator damage will occur.** |

★If the pulley angle is wrong, adjust the angle as follows.

○Connect:

2 pins Connector

3 pins Connector

○Turn the ignition switch on.

○Confirm the pulley turns clockwise or counterclockwise then it stops at the original position.

# Clutch

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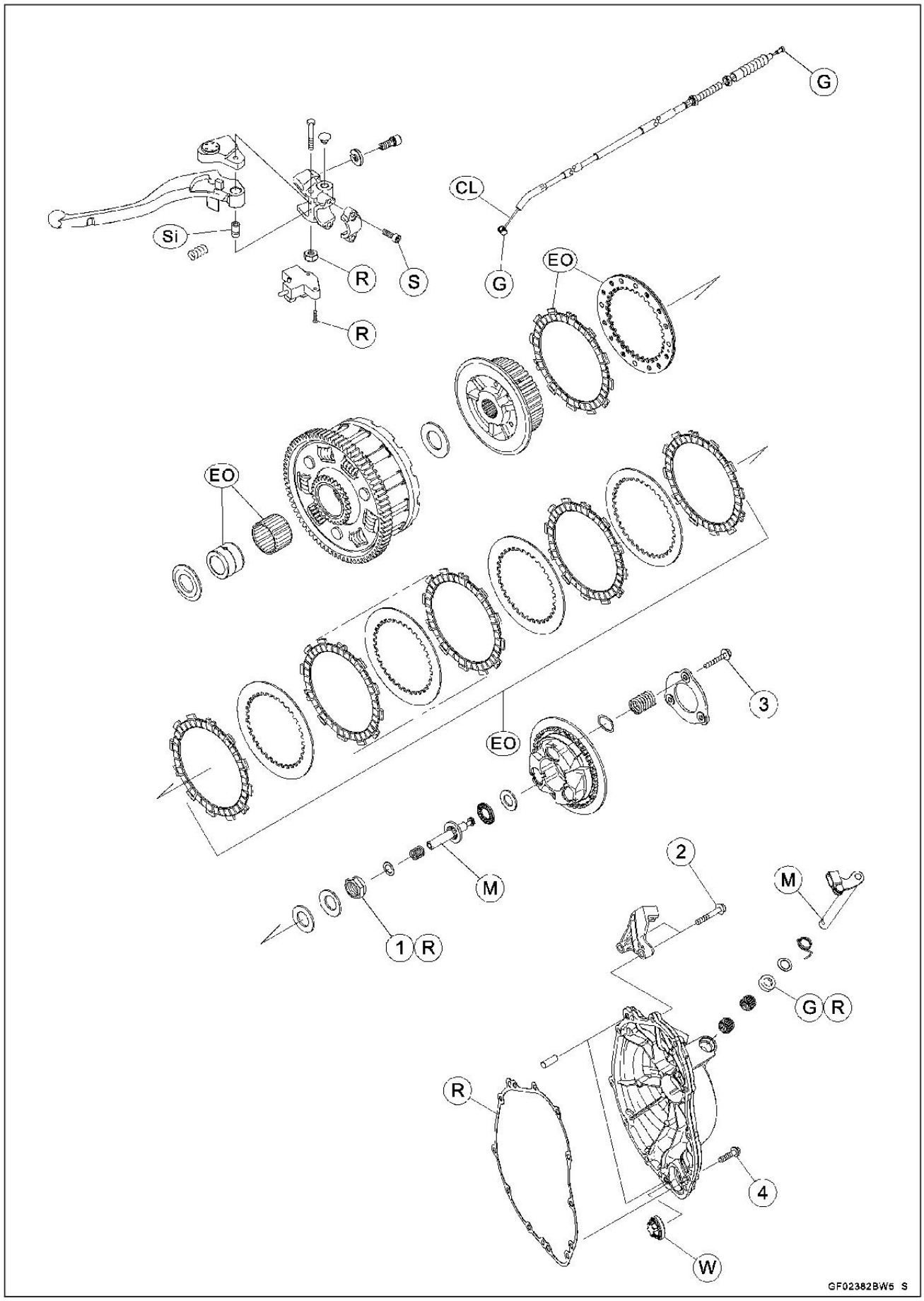
## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Clutch Hub Nut | 135 | 13.8 | 100 | R |
| 2 | Clutch Cover Bolts (L = 40 mm) | 10 | 1.0 | 89 in·lb | |
| 3 | Clutch Stopper Bolts | 9.0 | 0.92 | 80 in·lb | |
| 4 | Clutch Cover Bolts (L = 25 mm) | 10 | 1.0 | 89 in·lb | |

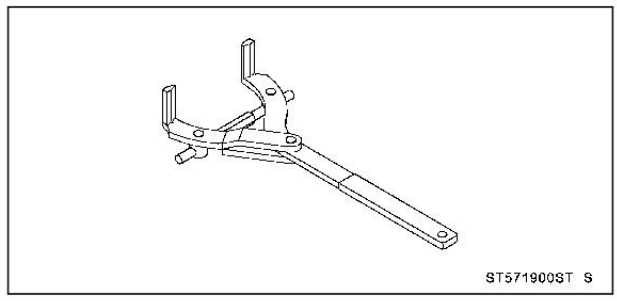
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
W: Apply water.

## Specifications

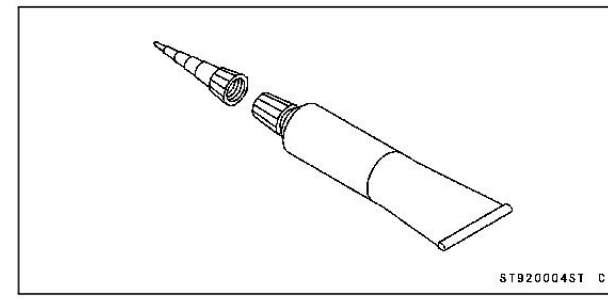
| Item | Standard | Service Limit |
|---|---|---|
| **Clutch Lever and Cable** | | |
| Clutch Lever Free Play | 2 – 3 mm (0.08 – 0.12 in.) | – – – |
| **Clutch** | | |
| Clutch Plate Assembly Length | (Reference)<br>40.5 – 41.3 mm (1.59 – 1.63 in.) | – – – |
| Friction Plate Thickness | 2.72 – 2.88 mm (0.107 – 0.113 in.) | 2.5 mm (0.10 in.) |
| Friction Plate Warp | 0.15 mm (0.0059 in.) or less | 0.3 mm (0.01 in.) |
| Steel Plate Warp | 0.15 mm (0.0059 in.) or less | 0.3 mm (0.01 in.) |

## Special Tools and Sealant

**Clutch Holder:**
**57001-1900**




**Liquid Gasket, TB1211F:**
**92104-0004**



## Clutch Lever and Cable

### *Clutch Lever Free Play Inspection*

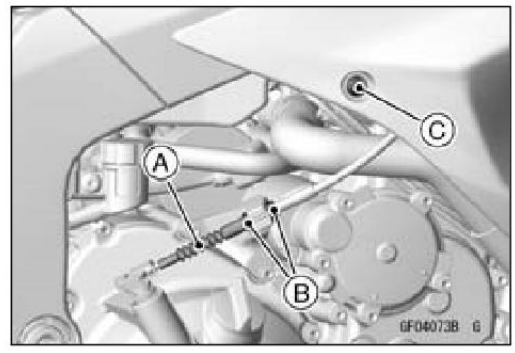
- Refer to the Clutch Operation Inspection (see Clutch Operation Inspection (2-35)).

### *Clutch Lever Free Play Adjustment*

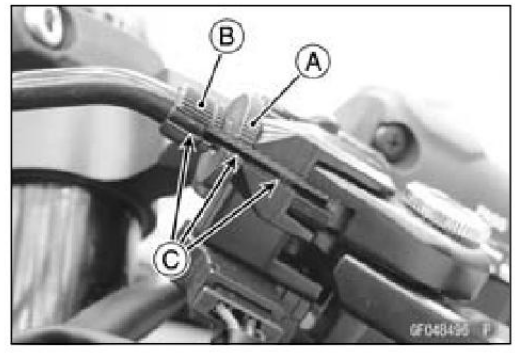
- Refer to the Clutch Operation Inspection (see Clutch Operation Inspection (2-35)).

### *Clutch Cable Removal*

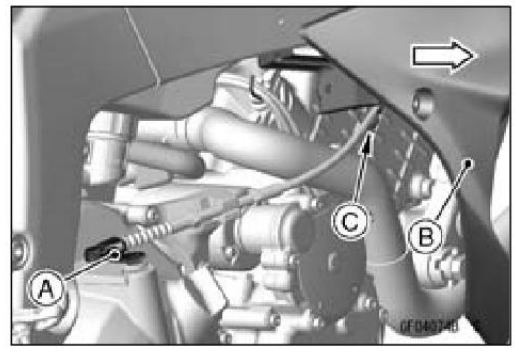
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen the nuts [B], and slide the lower end of the clutch cable to give the cable plenty of play.
- Remove the bolt [C].




- Loosen the locknut [A] and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and remove the cable from the clutch lever.




- Free the clutch inner cable tip from the clutch release lever [A].
- Pull the middle inner fairing [B] outward to free the clutch cable from the clamp [C].
- Remove the clutch cable out of the frame.




### *Clutch Cable Installation*

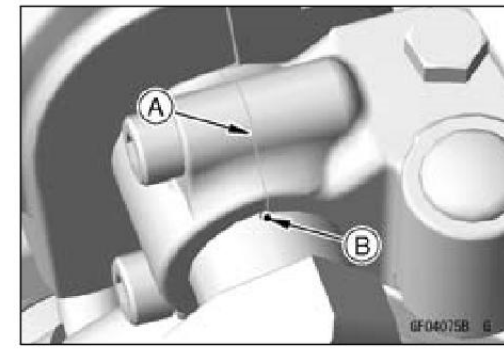
- Installation is the reverse of removal.
- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Adjust the clutch cable (see Clutch Operation Inspection (2-35)).

### *Clutch Cable Lubrication*

- Refer to the Chassis Parts Lubrication (see Chassis Parts Lubrication (2-64)).

## Clutch Lever and Cable

### *Clutch Lever Assembly Installation*

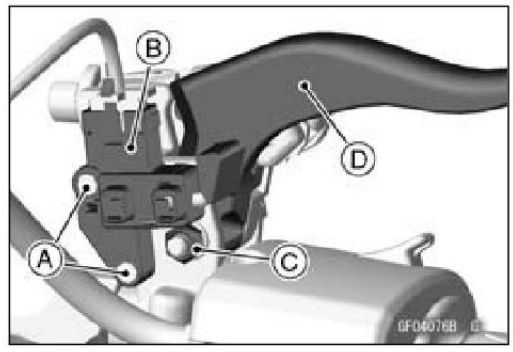



- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B] of the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

○There will be a gap at the lower part of the clamp after tightening.

## Clutch Lever and Cable

### *Clutch Lever Removal*



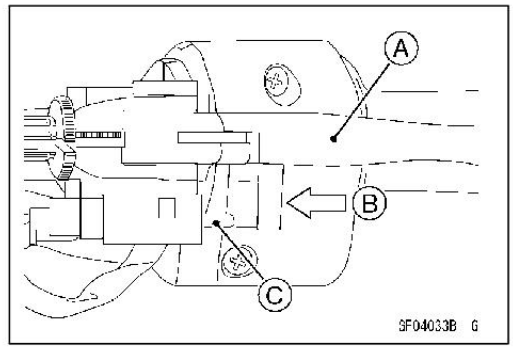

- Remove the upper end of the clutch cable (see Clutch Cable Removal(6-6)).
- Loosen the clutch lever holder clamp bolts.
- Remove:
  Starter Lockout Switch Screws [A]
  Starter Lockout Switch [B]
  Clutch Lever Pivot Locknut [C]
  Clutch Lever Pivot Bolt
  Clutch Lever [D]

### *Clutch Lever Installation*

**⚠ WARNING**

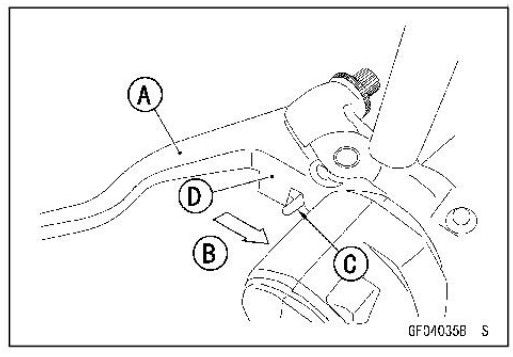
**If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury. Check that the starter lockout switch operates properly when installing the clutch lever.**

- Replace the locknut with a new one.
- Apply silicone grease to the clutch lever collar.
- Install the clutch lever [A] from frame left side [B] so that it may not damage a pin [C] of the starter lockout switch.



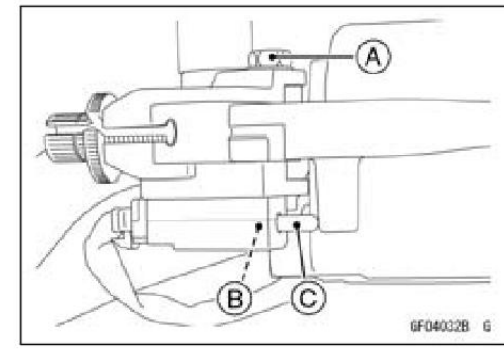

***NOTICE***

**Do not install the clutch lever [A] from the front side [B]. The pin [C] of the starter lockout switch may be damaged in the projection [D] of a clutch lever.**



## Clutch Lever and Cable

- Tighten the bolt [A] and locknut [B].
- Install the upper end of the clutch cable (see Clutch Cable Installation(6-6)).
- Adjust the clutch cable (see Clutch Operation Inspection (2-35)).
- Check that the pin [C] of the starter lockout switch moves smoothly.




**⚠ WARNING**

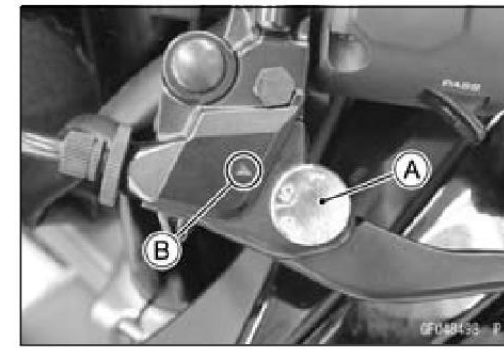
**Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.**

### *Clutch Lever Position Adjustment*

The adjuster has 5 positions so that the clutch lever position can be adjusted to suit the operator's hand.

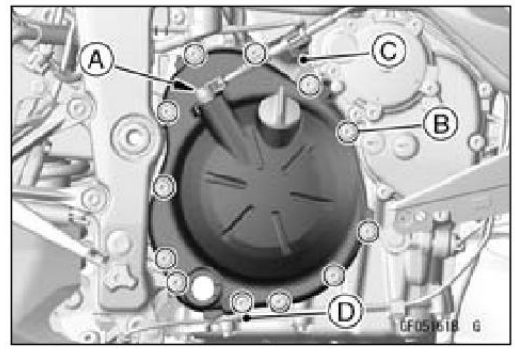
- Push the lever forward and turn the adjuster [A] to align the number with the mark [B] on the lever holder.

○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.

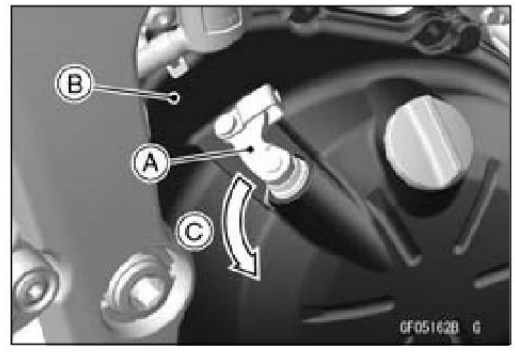


## Clutch Cover

### *Clutch Cover Removal*

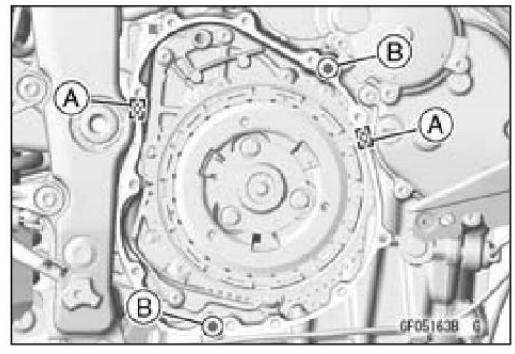



- Drain the engine oil (see Engine Oil Change(2-36)).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-9))
  Clutch Cable Lower End [A] (see Clutch Cable Removal(6-6))
  Clutch Cover Bolts [B]
  Bracket [C]
  Clamp [D] (Equipped Models)



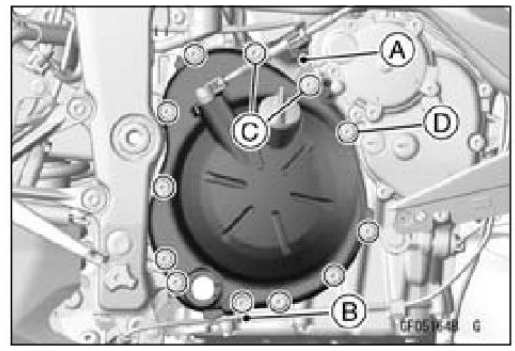

- Turn the release lever [A] counterclockwise as shown, and remove the clutch cover [B].
  About 90° [C]

### *Clutch Cover Installation*




- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] where the mating surface of the crankcase touches the clutch cover gasket.

  **Sealant - Liquid Gasket, TB1211F: 92104-0004**
- Be sure that the dowel pins [B] are in position.
- Replace the clutch cover gasket with a new one and install it.



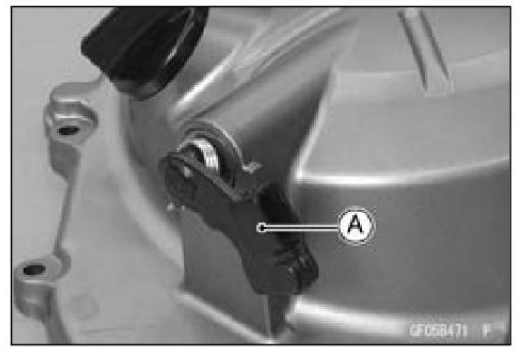

- Install:
  Clutch Cover
  Bracket [A]
  Clamp [B] (Equipped Models)
- Tighten:

  **Torque - Clutch Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

  L = 40 mm (1.57 in.) [C]
  L = 25 mm (0.98 in.) [D]
- Install the removed parts.

### *Release Shaft Removal*

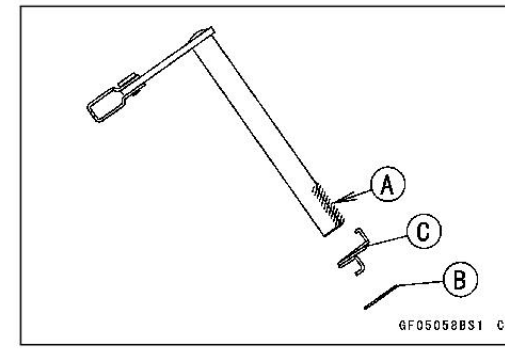
| *NOTICE* |
| --- |
| **Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.** |




- Remove the clutch cover (see Clutch Cover Removal(6-10)).
- Pull the release lever and shaft assembly [A] straight out of the clutch cover.

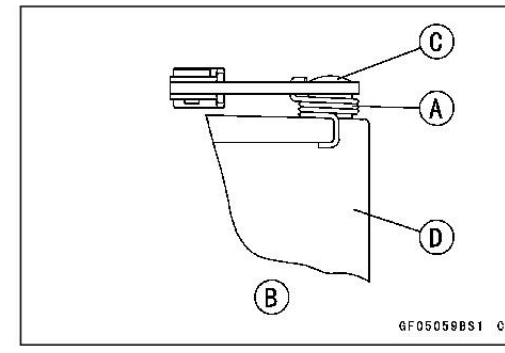
## Clutch Cover

### *Release Shaft Installation*



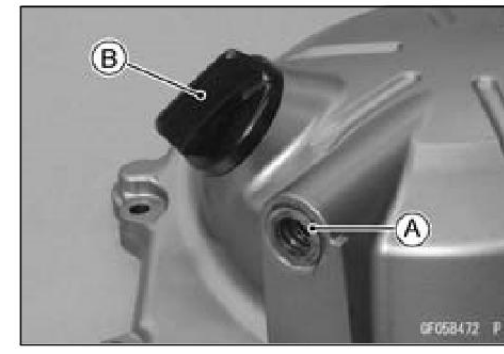

- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply engine oil to the needle bearings in the hole of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Install the washer [B] and spring [C].
- Insert the release shaft straight into the upper hole of the clutch cover.

| *NOTICE* |
| --- |
| **When inserting the release shaft, be careful not to remove the spring of the oil seal.** |

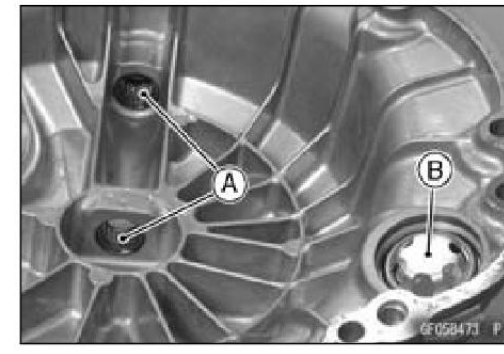



- Fit the spring [A] as shown in the figure.
  Rear View [B]
  Release Shaft [C]
  Clutch Cover [D]

### *Clutch Cover Disassembly*



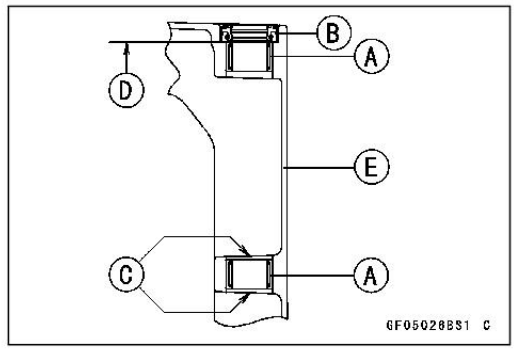

- Remove:
  Clutch Cover (see Clutch Cover Removal(6-10))
  Release Lever and Shaft Assembly (see Release Shaft Removal(6-10))
  Oil Seal [A]
  Oil Filler Plug [B]




- Remove:
  Needle Bearings [A]
  Oil Level Inspection Window [B]

## Clutch Cover

### *Clutch Cover Assembly*




- Replace the needle bearings and oil seal with new ones.

**NOTE**

○*Install the needle bearings so that the manufacture's mark face out.*

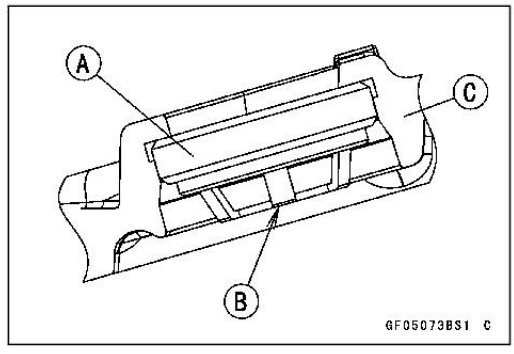
- Install the needle bearings [A] and oil seal [B] position as shown.

○Press the lower bearing, do not protrude from the boss [C] of the clutch cover.

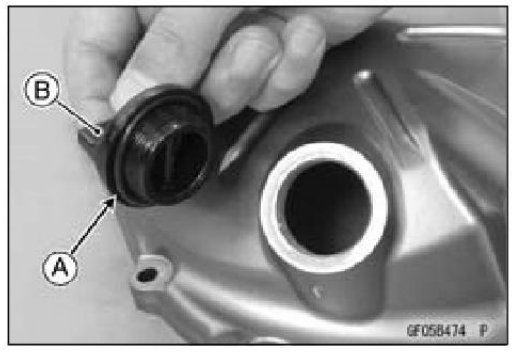
○Press the upper bearing so that the bearing surface [D] is flush with the housing end of clutch cover [E].

○Press the oil seal until the bottom.

- Apply grease to the oil seal lips.




- Apply water to the rubber portion [A] of the oil level inspection window.
- Press the oil level inspection window so that its projection [B] faces inside of the clutch cover [C].

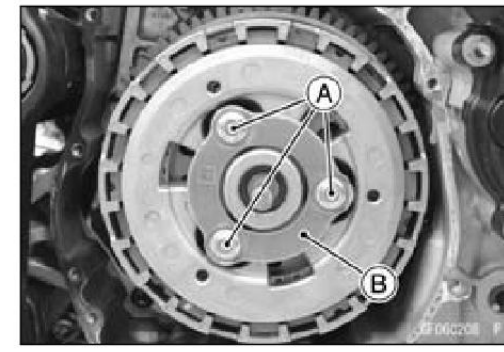



- Replace the O-ring [A] of the oil filler plug [B] with a new one.
- Apply grease to the new O-ring.

## Clutch

### *Clutch Removal*

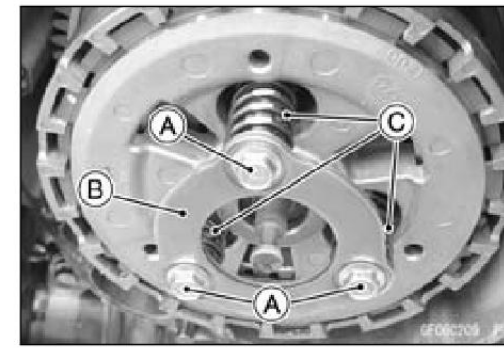
- Remove:
  Clutch Cover (see Clutch Cover Removal(6-10))
- Loosen the three clutch stopper bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].



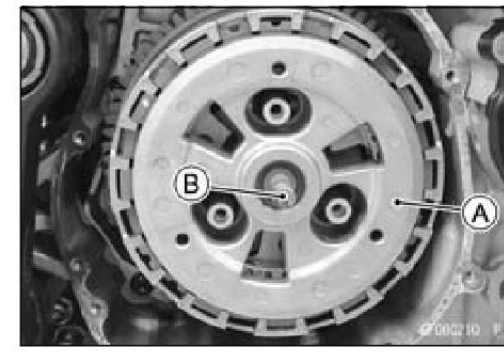

| *NOTICE* |
| --- |
| **Do not loosen the one or two clutch stopper bolt at once to prevent clutch stopper plate from warpage by the spring force.** |

- Remove:
  Clutch Stopper Bolts [A]
  Clutch Stopper Plate [B]
  Clutch Springs [C]
- Visually inspect the clutch stopper plate.

★If the clutch stopper plate is warped, replace it with a new one.

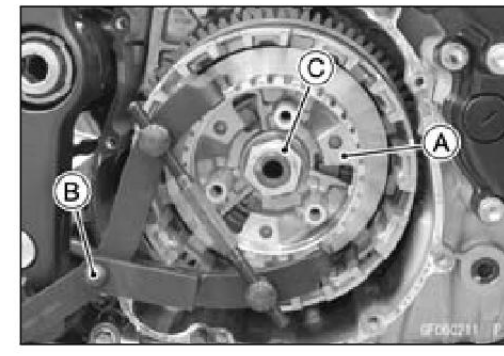



- Remove:
  Clutch Pressure Plate [A] (with Shim, Bearing and Pusher [B])
  Friction Plates and Steel Plates

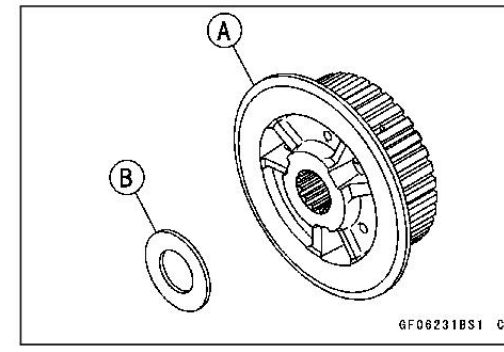



- Hold the clutch hub [A] steady with the clutch holder [B], and remove the clutch hub nut [C] and washers.

**Special Tool - Clutch Holder: 57001-1900**

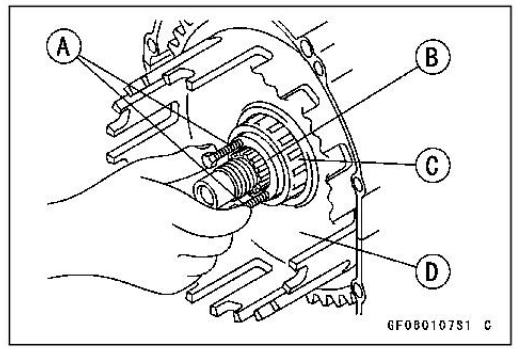



- Remove:
  Clutch Hub [A]
  Spacer [B]



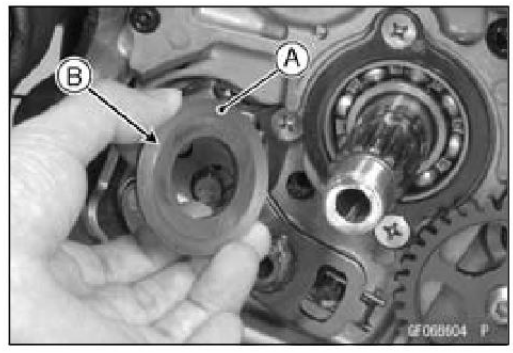
## Clutch

- Using the two 4 mm (0.16 in.) bolts [A], pull out the sleeve [B], needle bearing [C] and clutch housing [D].
- Remove the spacer.

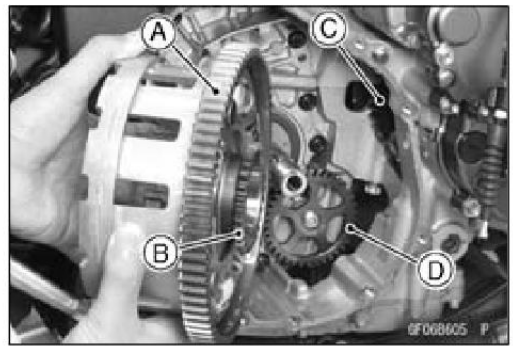



### *Clutch Installation*

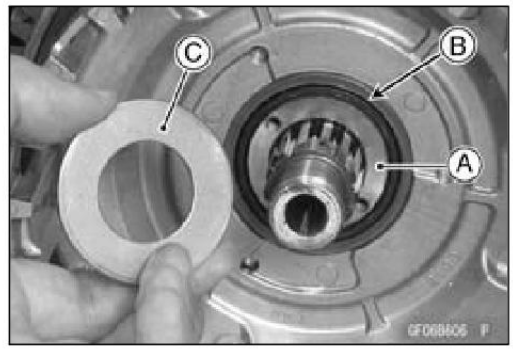
- Install the spacer [A] so that the stepped side [B] faces inward.



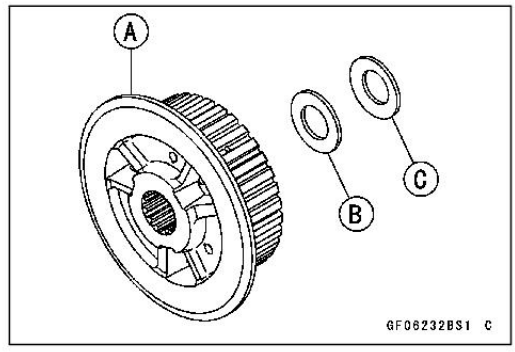

- Engage the clutch housing gear [A] and oil pump drive gear [B] with the crankshaft primary gear [C] and oil pump driven gear [D].




- Apply engine oil to the sleeve [A] and needle bearing [B].
- Install:
  Needle Bearing
  Sleeve
  Spacer [C]




- Install:
  Clutch Hub [A]
  Washer [B]
- Install the washer [C] so that the “OUT SIDE” mark faces outward.

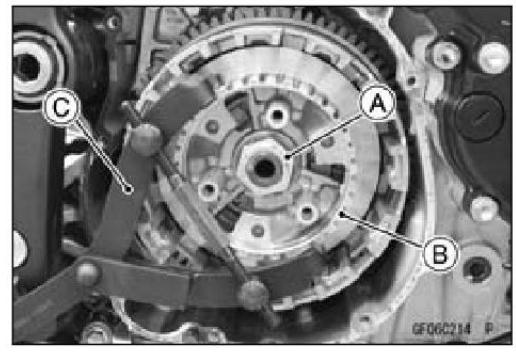


## Clutch

- Replace the clutch hub nut [A] with a new one.
- Hold the clutch hub [B] steady with the clutch holder [C], and tighten the clutch hub nut.

**Special Tool - Clutch Holder: 57001-1900**

**Torque - Clutch Hub Nut: 135 N·m (13.8 kgf·m, 100 ft·lb)**

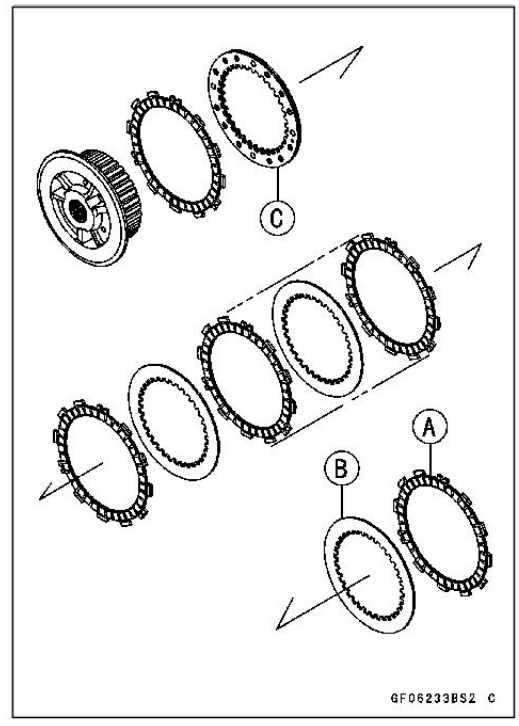



- Install the friction plates [A] and steel plates [B] alternately as shown.

Thick Steel Plate [C]

***NOTICE***

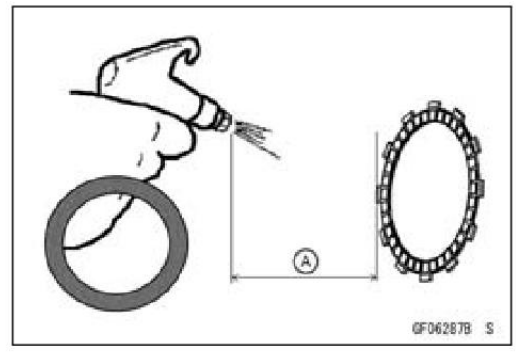
**If new dry friction plates and steel plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.**

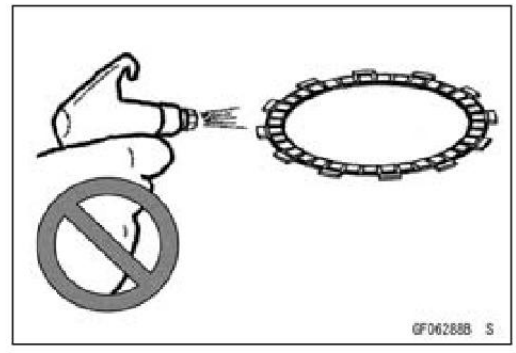



***NOTICE***

**High pressure air blasts may detach clutch friction material from the friction plate. To prevent material detachment, set air pressure lower than 0.5 MPa (5 kgf/cm², 73 psi), do not place air nozzle closer than 30 cm (12 in.) to friction plate and only blow air at a right angle to the plate, facing the friction material. Do not blow air from the side (horizontally) of the plate since it is more likely to detach the friction material.**

more than 30 cm (12 in.) [A]

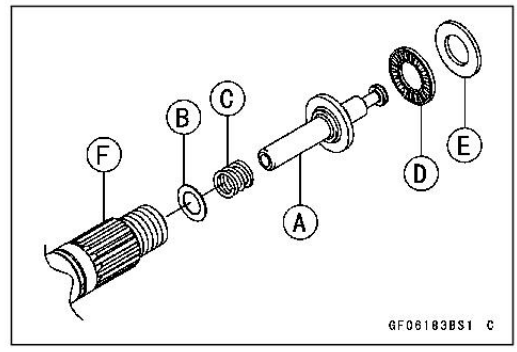


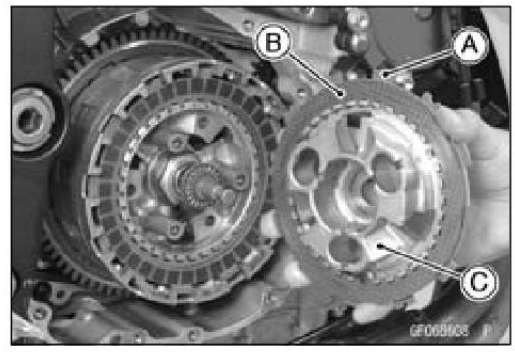

○Install the last friction plate and steel plate later with the clutch pressure plate.

## Clutch

- Apply molybdenum disulfide grease to the pusher end [A].
- Install the washer [B], spring [C], bearing [D] and shim [E] to the pusher.
- Install the pusher to the drive shaft [F] direction as shown.



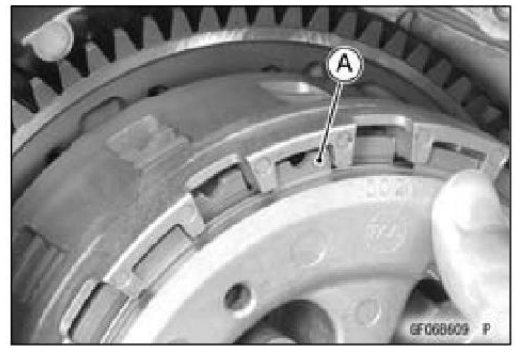

- Put the last friction plate [A] and steel plate [B] on the clutch pressure plate [C] and install them.



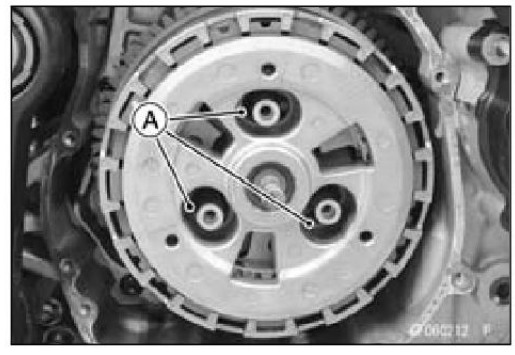

- Install the last friction plate so that the tangs [A] fit into the grooves in the housing as shown.

**NOTE**

○*Make sure that the clutch pressure plate is installed without a gap.*

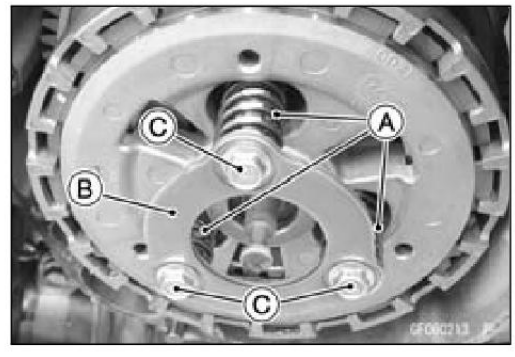



- Check that the spring seats [A] are in place on the clutch pressure plate.



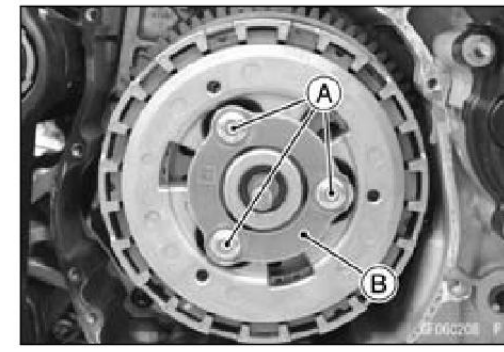

- Install:
  Clutch Springs [A]
  Clutch Stopper Plate [B]
- Tighten the three clutch stopper bolts [C] by hand until they just begin to press each clutch spring.

○Hold the clutch pressure plate by hand while tightening the clutch stopper bolts.



## Clutch

● Tighten the three clutch stopper bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].




| *NOTICE* |
| --- |
| **Do not tighten the one or two clutch stopper bolt at once to prevent the clutch stopper plate from warpage by the spring force.** |

● Tighten:

**Torque - Clutch Stopper Bolts: 9.0 N·m (0.92 kgf·m, 80 in·lb)**

● Install the clutch cover (see Clutch Cover Installation(6-10)).

### *Clutch Plate Assembly Length Measurement*

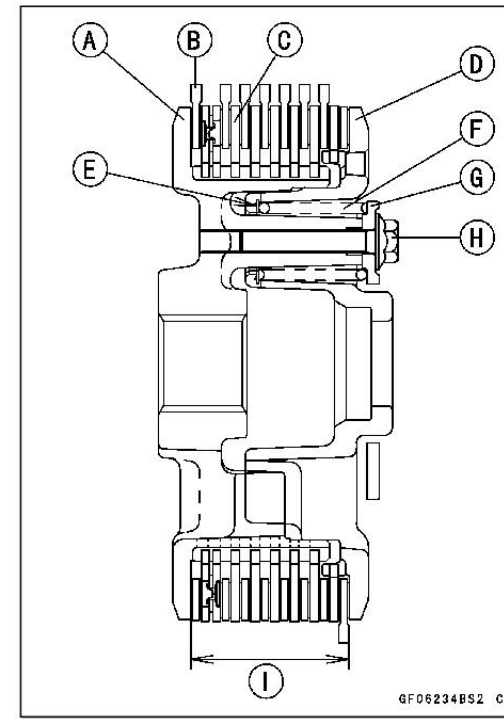
● Assemble the following parts.
Clutch Hub [A]
Friction Plates [B]
Steel Plates [C]
Clutch Pressure Plate [D]
Spring Seats [E]
Clutch Springs [F]
Clutch Stopper Plate [G]
Clutch Stopper Bolts [H]

**Torque - Clutch Stopper Bolts: 9.0 N·m (0.92 kgf·m, 80 in·lb)**

● Measure the clutch plate assembly length [I].

**Clutch Plate Assembly Length (Reference)**
**40.5 – 41.3 mm (1.59 – 1.63 in.)**

★If the length is not within the specified range, adjust the length (see Clutch Plate Assembly Length Adjustment(6-18)).



## Clutch

### *Clutch Plate Assembly Length Adjustment*

- Inspect the clutch plate assembly length, and then replace the steel plate(s) which brings the length within the specified range.
- Remove:
  Clutch Stopper Bolts
  Clutch Stopper Plates
  Clutch Springs
  Clutch Pressure Plate
  Spring Seats
- Replace the following steel plate(s).

| Thickness | Part Number |
|---|---|
| 2.0 mm (0.079 in.) | 13089-1073 |
| 2.3 mm (0.091 in.) (STD) | 13089-1084 |
| 2.6 mm (0.102 in.) | 13089-1115 |

**NOTE**

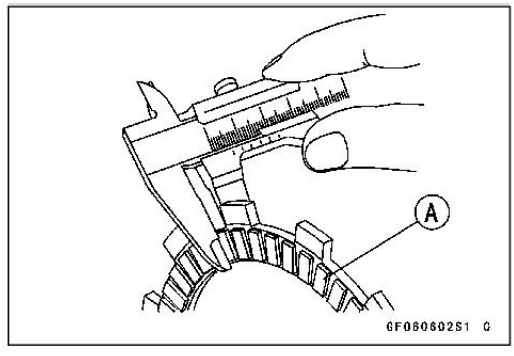
○*Do not use the steel plate of 2.0 mm (0.079 in.) and 2.6 mm (0.102 in.) thickness at the same time.*

○*When adjusting the clutch plate assembly, install the steel plate of 2.0 mm (0.079 in.) or 2.6 mm (0.102 in.) thickness to the second or third from the clutch pressure plate.*

- Install the removed parts, and inspect the clutch plate assembly length.

**Torque - Clutch Stopper Bolts: 9.0 N·m (0.92 kgf·m, 80 in·lb)**

### *Clutch Plate, Wear, Damage Inspection*

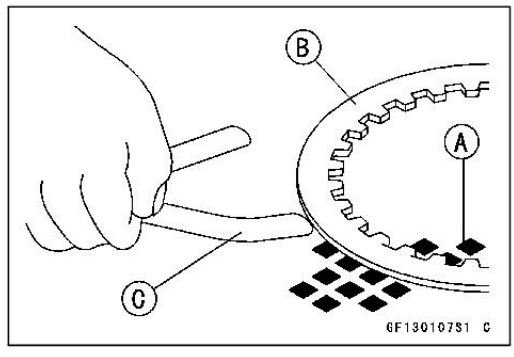



- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

**Friction Plate Thickness**
**Standard: 2.72 – 2.88 mm (0.107 – 0.113 in.)**
**Service Limit: 2.5 mm (0.10 in.)**

### *Clutch Plate Warp Inspection*




- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

★If any plate is warped over the service limit, replace it with a new one.

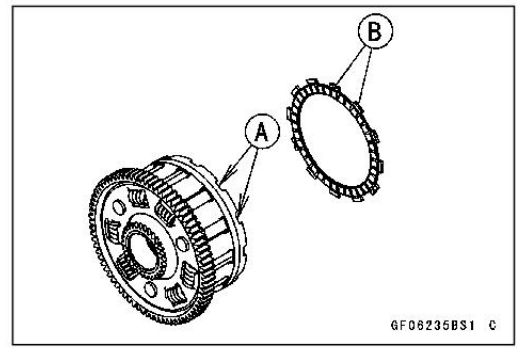
**Friction Plate Warp**
**Standard: 0.15 mm (0.0059 in.) or less**
**Service Limit: 0.3 mm (0.01 in.)**
**Steel Plate Warp**
**Standard: 0.15 mm (0.0059 in.) or less**
**Service Limit: 0.3 mm (0.01 in.)**

## Clutch

### *Clutch Housing Finger Inspection*

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.

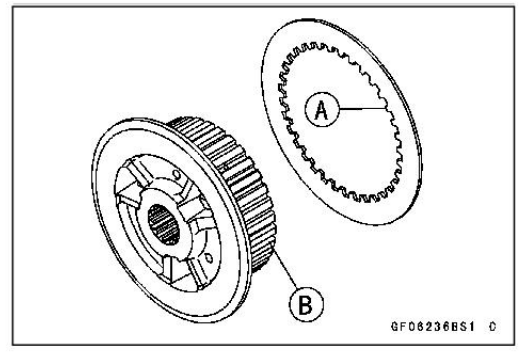
★If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.




### *Clutch Housing Spline Inspection*

- Visually inspect where the teeth [A] on the steel plates wear against the clutch hub splines [B].

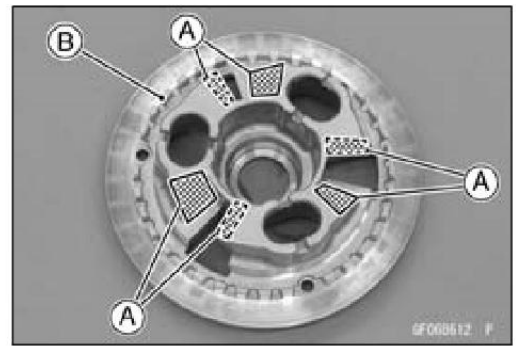
★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.

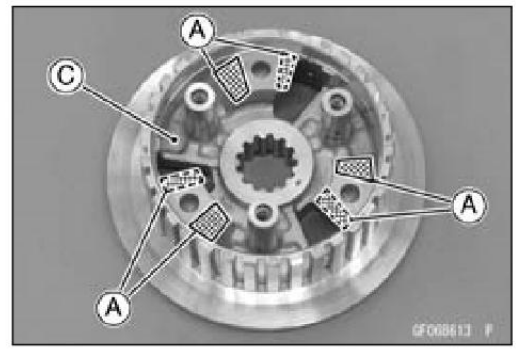



### *Clutch Pressure Plate and Clutch Hub Inspection*

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.




### *Clutch Spring Inspection*

★If all the components are good, but the problem still exists, replace the clutch springs (see Clutch Removal(6-13)).

# Engine Lubrication System

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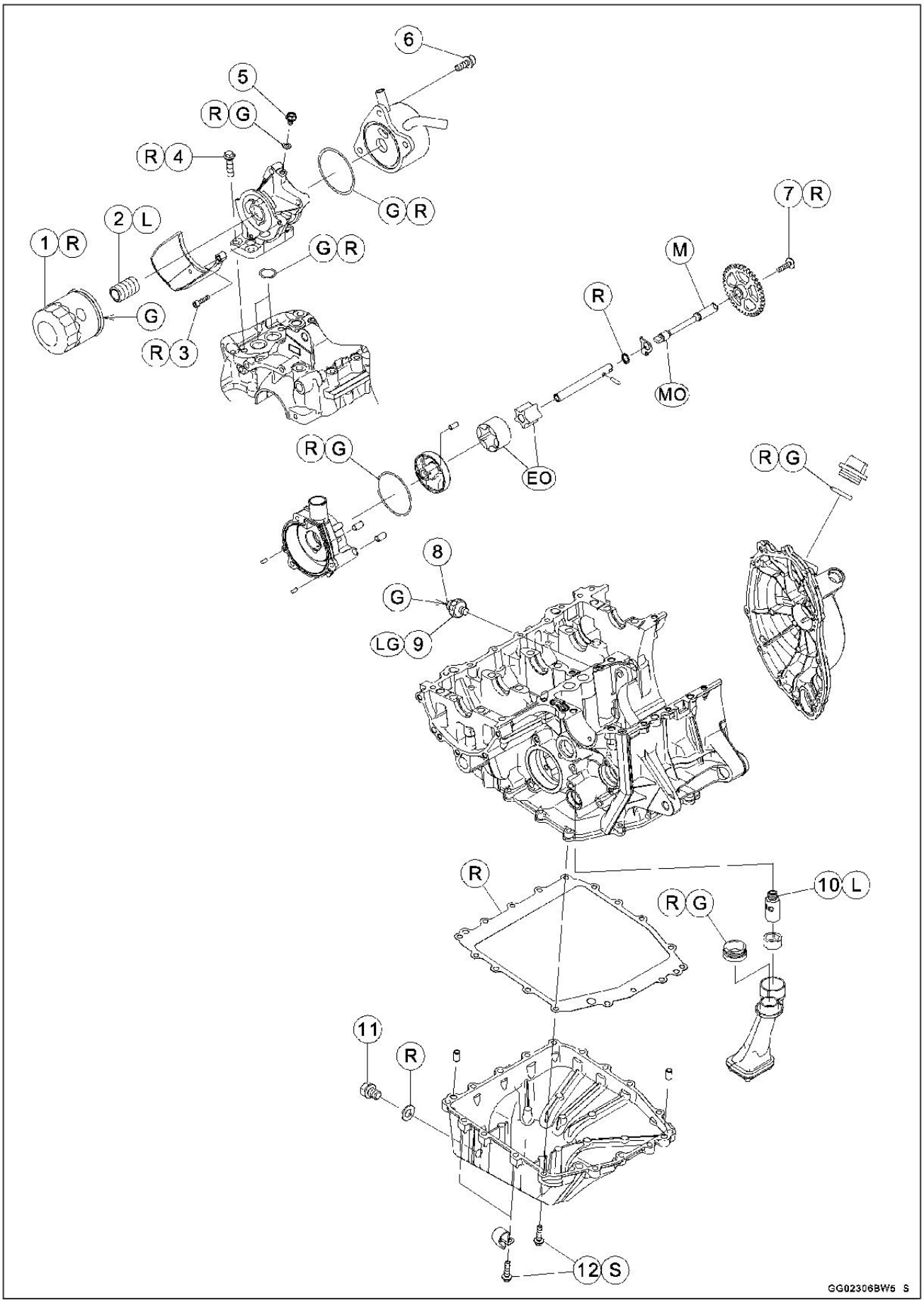
## Exploded View

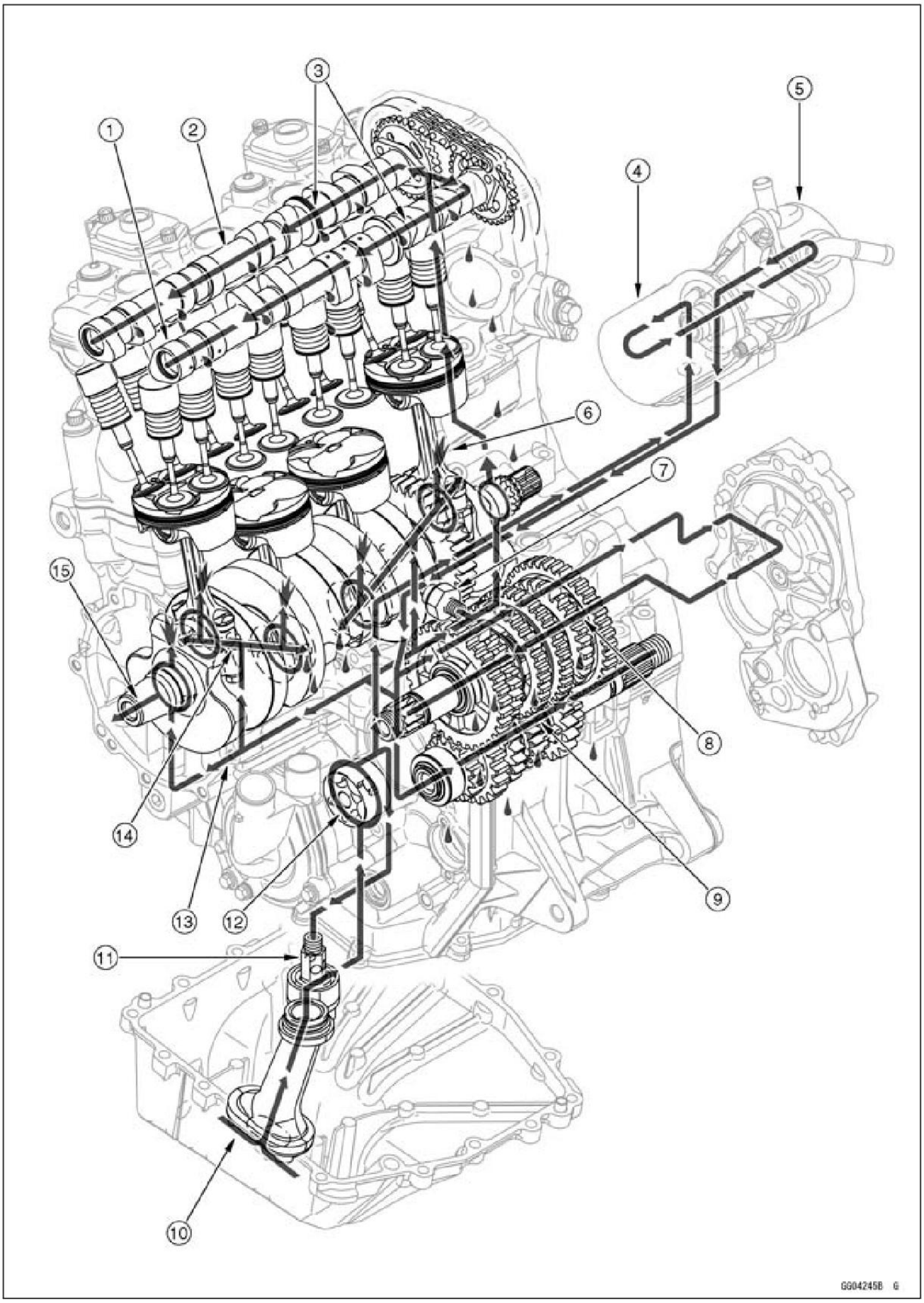


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Oil Filter | 17 | 1.7 | 13 | R |
| 2 | Oil Filter Pipe | 25 | 2.5 | 18 | L |
| 3 | Oil Filter Guard Bolts | 4.0 | 0.41 | 35 in·lb | R |
| 4 | Oil Cooler/Oil Filter Case Bolts | 20 | 2.0 | 15 | R |
| 5 | Air Bleed Bolt | 10 | 1.0 | 89 in·lb | |
| 6 | Oil Cooler Bolts | 20 | 2.0 | 15 | |
| 7 | Oil Pump Driven Gear Bolt | 10 | 1.0 | 89 in·lb | R |
| 8 | Oil Pressure Switch Terminal Bolt | 2.0 | 0.20 | 18 in·lb | |
| 9 | Oil Pressure Switch | 15 | 1.5 | 11 | LG |
| 10 | Oil Pressure Relief Valve | 15 | 1.5 | 11 | L |
| 11 | Engine Oil Drain Bolt | 29 | 3.0 | 21 | |
| 12 | Oil Pan Bolts | 10 | 1.0 | 89 in·lb | S |

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent).
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

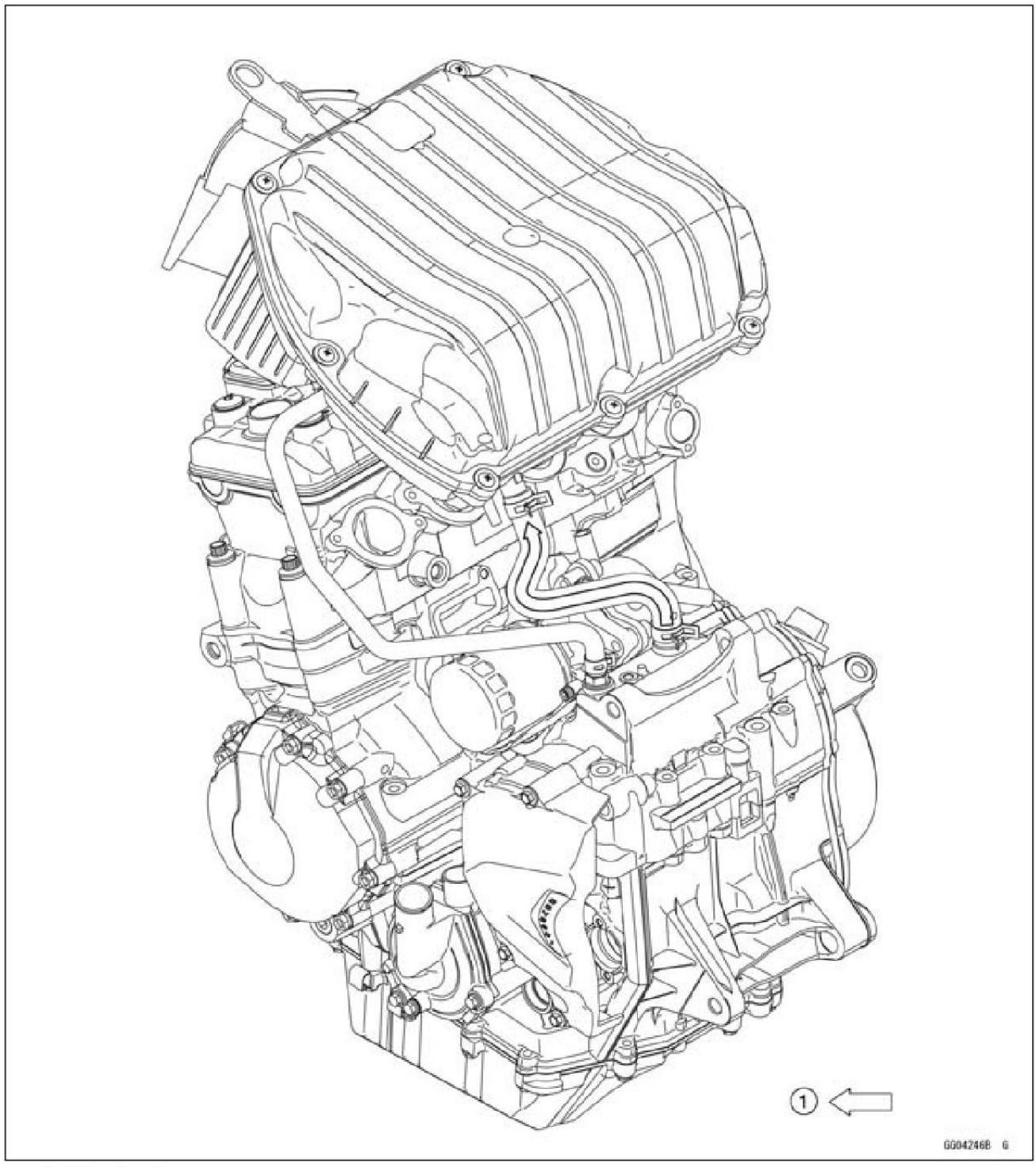
## Engine Oil Flow Chart



## Engine Oil Flow Chart

1. Intake Camshaft
2. Exhaust Camshaft
3. Camshaft Oil Passage
4. Oil Filter
5. Oil Cooler
6. Oil Jet
7. Oil Pressure Switch
8. Output Shaft Oil Passage
9. Drive Shaft Oil Passage
10. Oil Screen
11. Oil Pressure Relief Valve
12. Oil Pump
13. Main Oil Passage
14. Crankshaft Oil Passage
15. Alternator Oil Passage

## Engine Oil Flow Chart



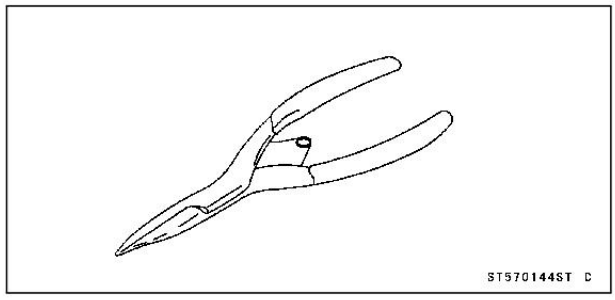

1. Blowby Gas

## Specifications

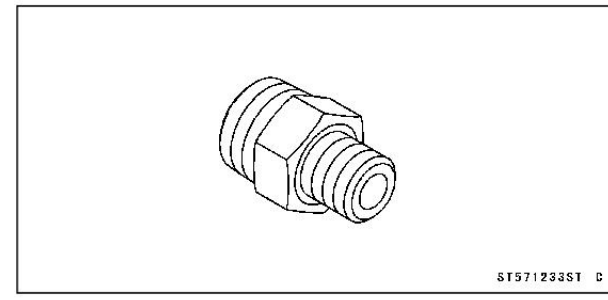
| Item | Standard |
|---|---|
| **Engine Oil** | |
| Type | API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 |
| Viscosity | SAE 10W-40 |
| Capacity | 2.8 L (3.0 US qt) (when filter is not removed.) |
| | 3.1 L (3.3 US qt) (when filter is removed.) |
| | 3.6 L (3.8 US qt) (when engine is completely dry.) |
| Level | Between upper and lower level lines (Wait several minutes after idling or running) |
| **Oil Pressure Measurement** | |
| Oil Pressure | 93 – 123 kPa (0.95 – 1.25 kgf/cm², 13 – 17.8 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F) |

## Special Tools and Sealant

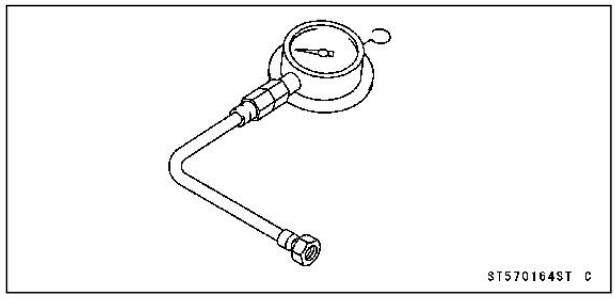
**Outside Circlip Pliers:**
**57001-144**



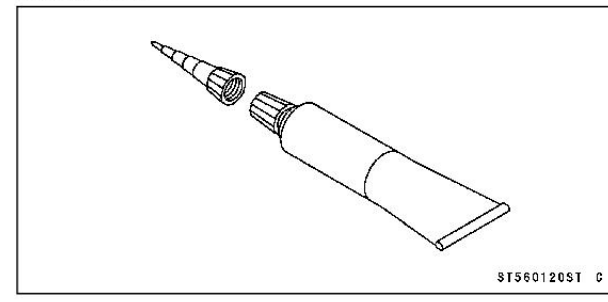

**Oil Pressure Gauge Adapter, PT3/8:**
**57001-1233**




**Oil Pressure Gauge, 10 kgf/cm²:**
**57001-164**




**Liquid Gasket, TB1211:**
**56019-120**

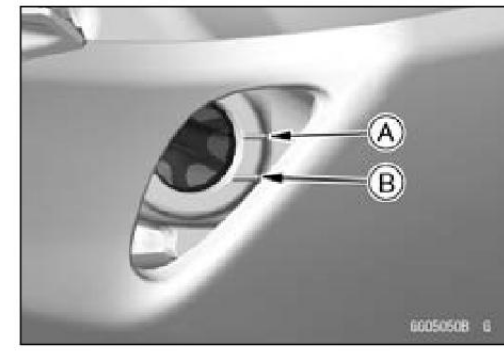


## Engine Oil and Oil Filter

**⚠ WARNING**

**Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.**

### *Oil Level Inspection*




- Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.

**NOTE**

- ○*Situate the motorcycle so that it is perpendicular to the ground.*
- ○*If the motorcycle has just been used, wait several minutes for all the oil to drain down.*
- ○*If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

***NOTICE***

**Racing the engine before the oil reaches every part can cause engine seizure.**
**If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red warning indicator light and oil pressure warning symbol will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.**

★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

**NOTE**

- ○*If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

### *Engine Oil Change*

- Refer to the Engine Oil Change (see Engine Oil Change(2-36)).

### *Oil Filter Replacement*

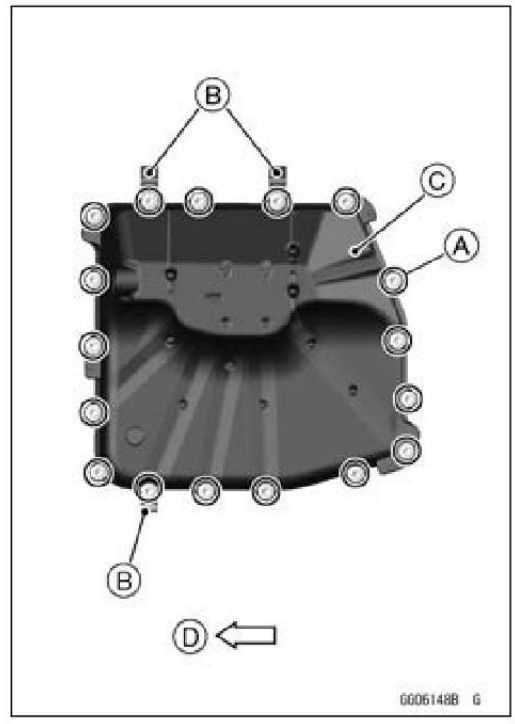
- Refer to the Oil Filter Replacement (see Oil Filter Replacement(2-37)).

## Oil Pan

### *Oil Pan Removal*

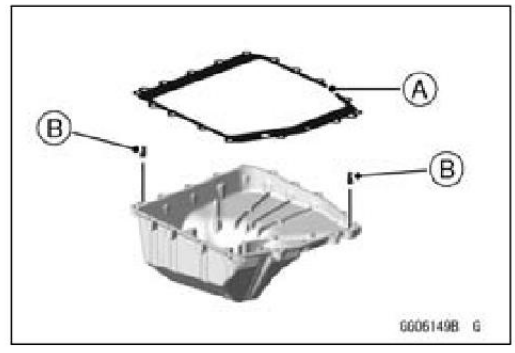
- Drain:
  Engine Oil (see Engine Oil Change(2-36))
- Remove:
  Exhaust Pipe (see Exhaust Pipe Removal(5-40))
  Oil Pan Bolts [A]
  Clamps [B]
  Oil Pan [C]
  Oil Pan Gasket

○Front side [D] of the vehicle.



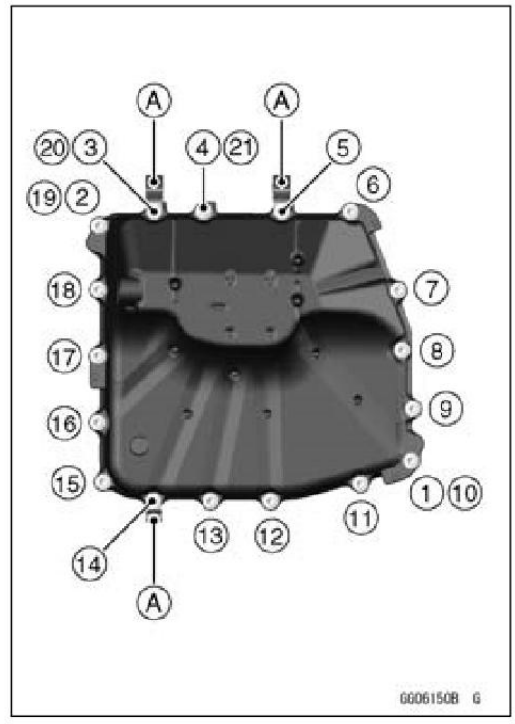

### *Oil Pan Installation*

- Replace the oil pan gasket [A] with a new one.
- Install the dowel pins [B] as shown.




- Install the clamps [A] as shown.
- Tighten the oil pan bolts as shown sequence [1 – 21].

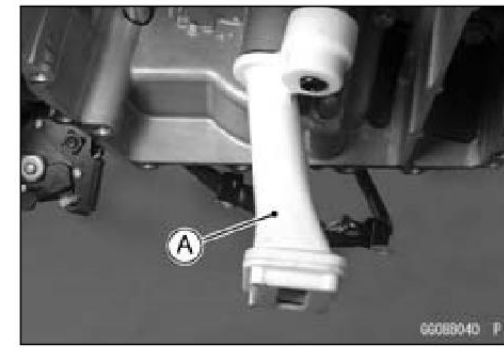
**Torque - Oil Pan Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**



## Oil Pressure Relief Valve

### *Oil Pressure Relief Valve Removal*

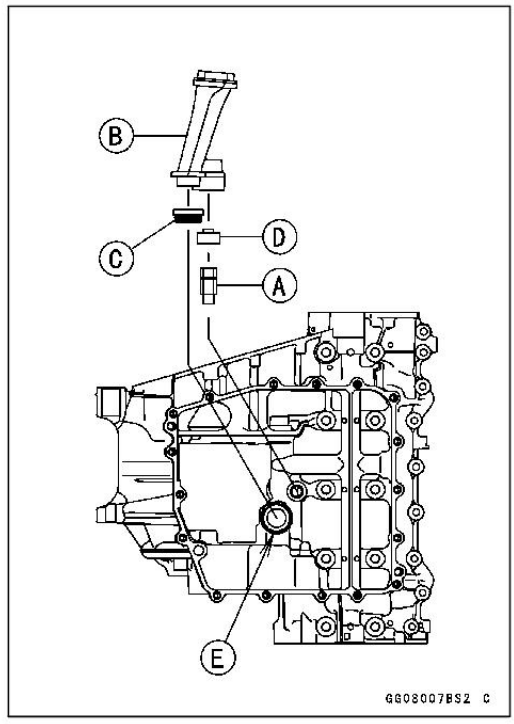
- Remove:
  Oil Pan (see Oil Pan Removal(7-10))
  Oil Screen [A]




- Remove the oil pressure relief valve [A].

## Oil Pressure Relief Valve

### *Oil Pressure Relief Valve Installation*




- Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent) to the oil pressure relief valve [A], and tighten it.

***NOTICE***

**Do not apply too much non-permanent locking agent to the threads. This may block the oil passage.**

**Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)**

- Clean the oil screen [B] with a high flash-point solvent and remove any particles stuck to them.

○Blow away the particles by applying compressed air from the inside to the outside (from the clean side to the dirty side).

**⚠ WARNING**

**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.**

**NOTE**

○*While cleaning the oil screen, check for any metal particles that might indicate internal engine damage.*

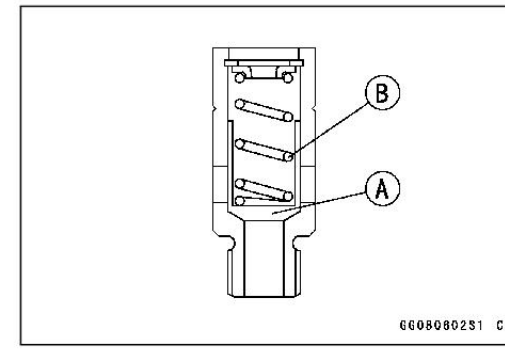
- Check the screen carefully for any damage, holes, broken wires.

★If the screen is damaged, replace it.

- Replace the O-ring [C] with a new one.
- Apply grease to the O-ring.
- Install the O-ring and damper [D] to the oil screen.
- Install the oil screen so that the crankcase rib [E] and relief valve fits the oil screen.
- Install the oil pan (see Oil Pan Installation(7-10)).

## Oil Pressure Relief Valve

### *Oil Pressure Relief Valve Inspection*




- Remove the oil pressure relief valve (see Oil Pressure Relief Valve Removal(7-11)).
- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

**NOTE**

○*Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

**⚠ WARNING**

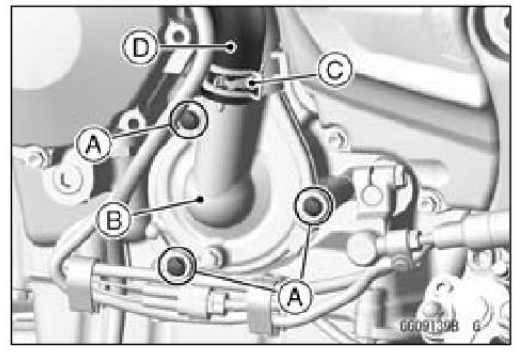
**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.**

★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

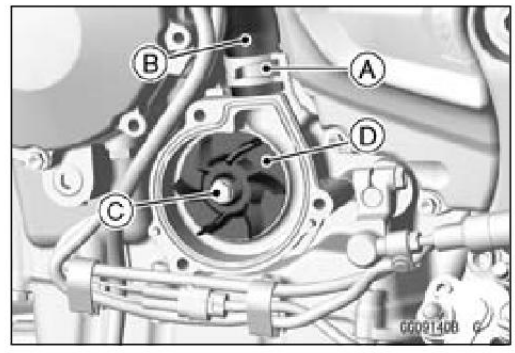
## Oil Pump

### *Oil Pump Removal*

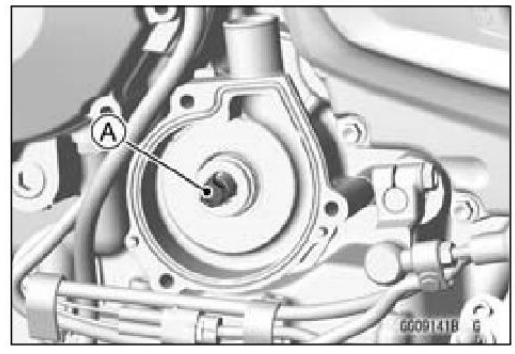
- Drain:
  Coolant (see Coolant Change(2-27))
  Engine Oil (see Engine Oil Change(2-36))
- Remove:
  Alternator Cover Plate (see Alternator Cover Removal(16-31))
  Water Pump Cover Bolts [A]
  Water Pump Cover [B]
- Slide the clamp [C].
- Disconnect the water hose [D].



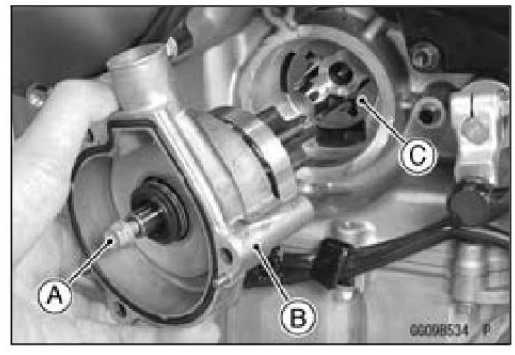

- Slide the clamp [A].
- Disconnect the water hose [B].
- Remove:
  Water Pump Impeller Bolt [C] and Washer
  Water Pump Impeller [D]



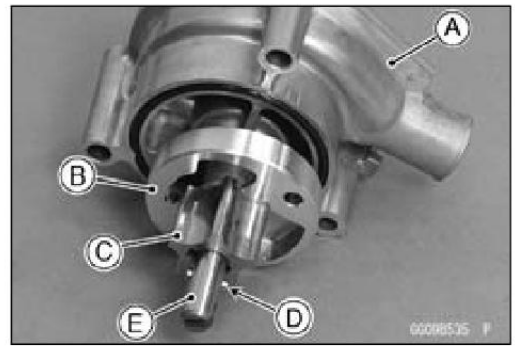

- Install the water pump impeller bolt [A] temporary.




- Using the water pump impeller bolt [A], remove the oil (water) pump [B] as an assembly.
- Remove the outer rotor [C] and impeller bolt.




- Remove:
  Water Pump Body [A]
  Oil Pump Cover [B]
  Inner Rotor [C]
  Pin [D]
  Oil (Water) Pump Shaft [E]

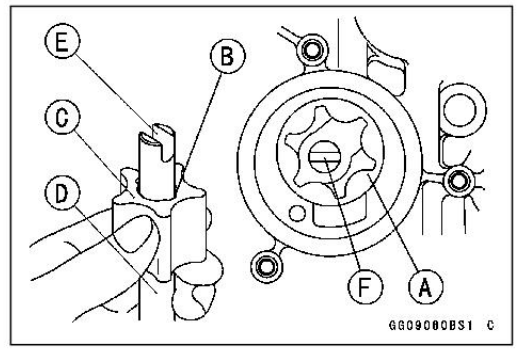


## Oil Pump

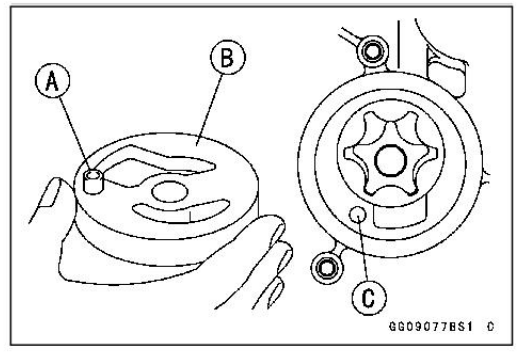
### *Oil Pump Installation*

- Install the outer rotor [A] into the crankcase.
- Install the pin [B] and inner rotor [C] to the oil (water) pump shaft [D], and install the assy.

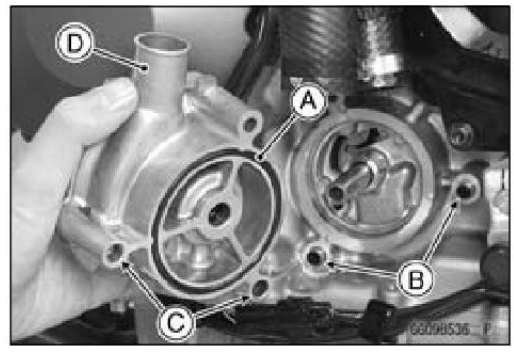
○Turn the pump shaft so that the slot [E] in its shaft fits onto the projection [F] of the oil pump drive shaft.



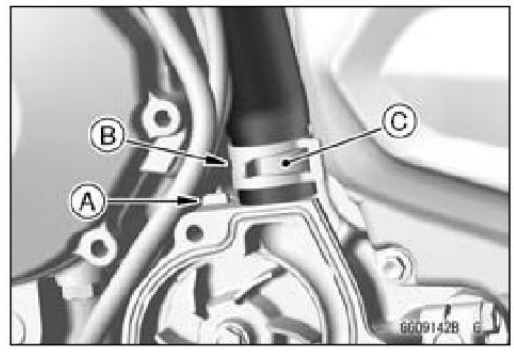

- Fit the pin [A] of the oil pump cover [B] into the hole [C] in the crankcase.




- Replace the O-ring [A] with a new one.
- Install the dowel pins [B].
- Fit the dowel pins of the crankcase into the holes [C] in the water pump body [D].

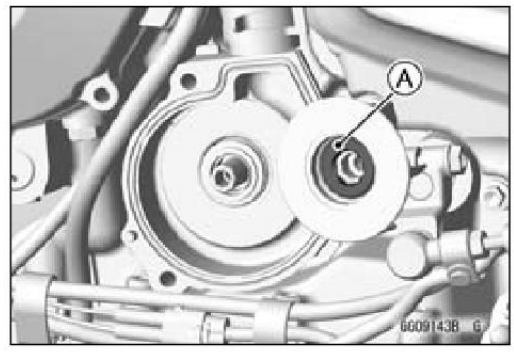



- Align the line [A] of the water pump body and the mark [B] of the water hose.
- Install the clamp [C].




- Apply coolant to the seating surface [A] on the water pump impeller.
- Install the water pump impeller, washer and bolt.
- Tighten:

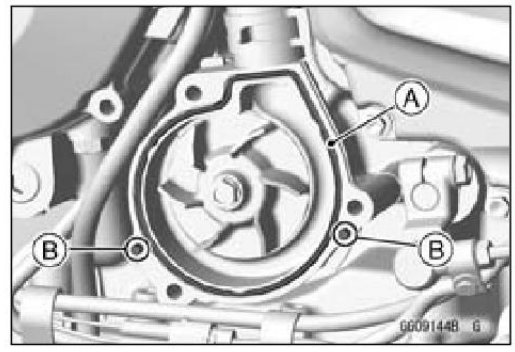
**Torque - Water Pump Impeller Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)**



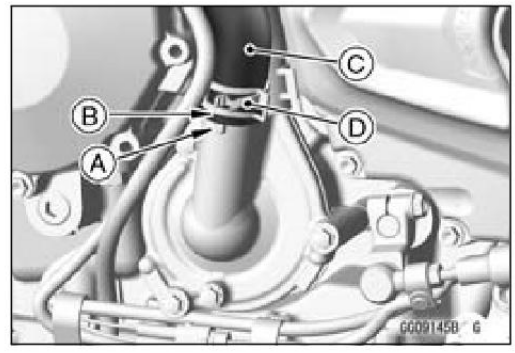
## Oil Pump

- Replace the O-ring [A] with a new one.
- Install the dowel pins [B] and water pump cover.
- Replace the water pump cover bolts with new ones, and tighten them.

**Torque - Water Pump Cover Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**

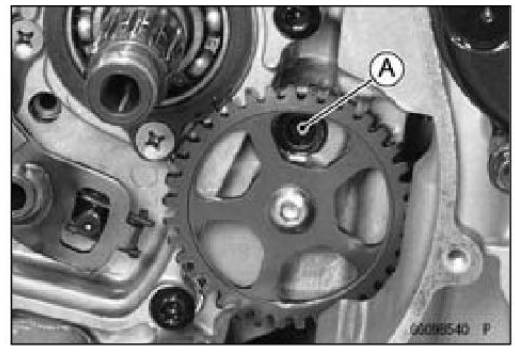



- Align the line [A] of the water pump cover and the mark [B] of the water hose [C].
- Install the clamp [D].

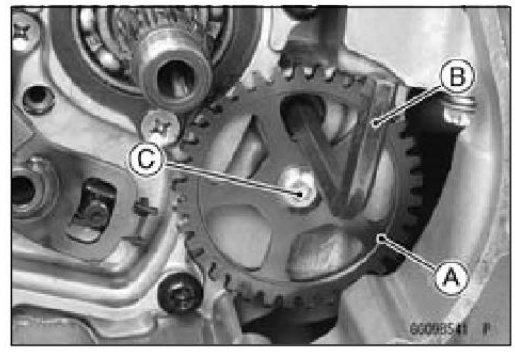



### *Oil Pump Driven Gear Removal*

- Remove the clutch (see Clutch Removal(6-13)).
- Fit the suitable tool into the hole of the oil passage plug [A].



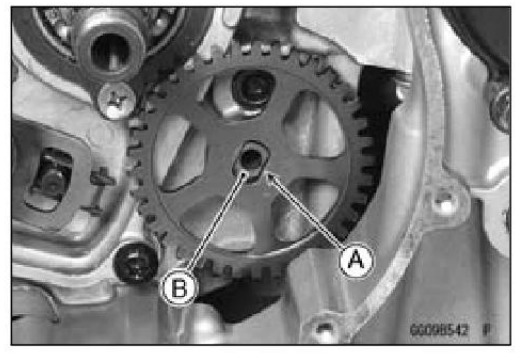

- Hold the oil pump driven gear [A] steady with the suitable tool [B], and remove the oil pump driven gear bolt [C].
- Remove the oil pump driven gear.




### *Oil Pump Driven Gear Installation*

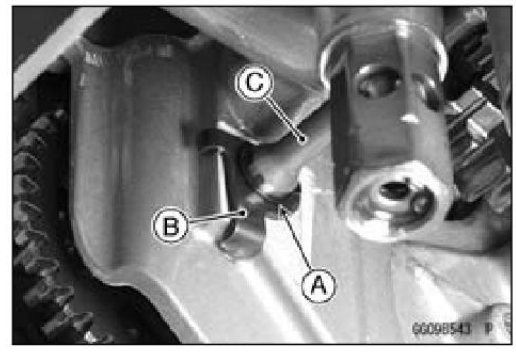
- Align the groove [A] of the oil pump driven gear to the oil pump drive shaft [B] to install the oil pump driven gear.
- Replace the oil pump driven gear bolt with a new one.
- Hold the oil pump driven gear steady with the suitable tool, and tighten the bolt.

**Torque - Oil Pump Driven Gear Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)**



## Oil Pump

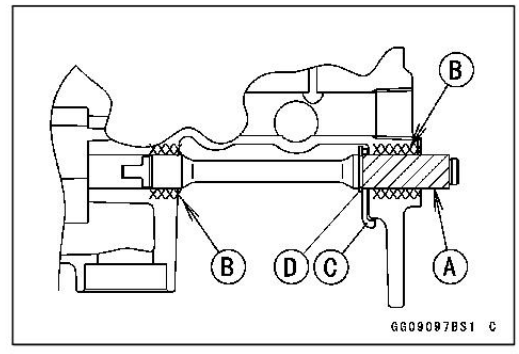
### *Oil Pump Drive Shaft Removal*




- Remove:
  Oil Pump Driven Gear (see Oil Pump Driven Gear Removal(7-16))
  Oil Pan (see Oil Pan Removal(7-10))
  Oil Screen (see Oil Pressure Relief Valve Removal(7-11))
  Circlip [A]
  Washer [B]
  Oil Pump Drive Shaft [C]

**Special Tool - Outside Circlip Pliers: 57001-144**

### *Oil Pump Drive Shaft Installation*



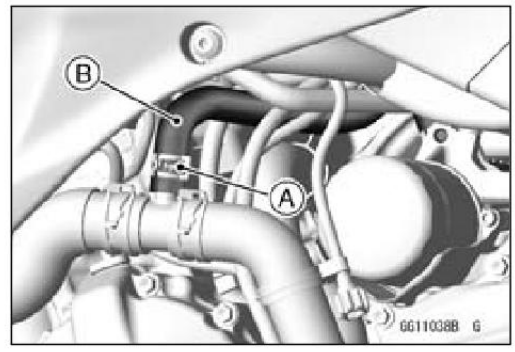

- Apply molybdenum disulfide grease [A] to the oil pump drive shaft.
- Apply molybdenum disulfide oil solution [B] to the crankcase.
- Install the oil pump drive shaft and washer [C] as shown.
- Replace the circlip [D] with a new one.
- Install the circlip into the groove of the oil pump drive shaft.

**Special Tool - Outside Circlip Pliers: 57001-144**

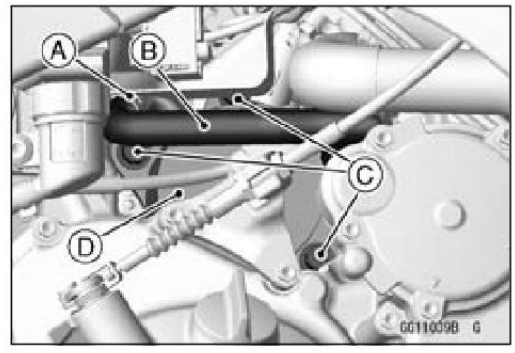
## Oil Cooler

### *Oil Cooler Removal*

- Drain:
  Coolant (see Coolant Change(2-27))
  Engine Oil (see Engine Oil Change(2-36))
- Remove:
  Starter Motor (see Starter Motor Removal(16-47))
- Slide the clamp [A].
- Disconnect the water hose [B].

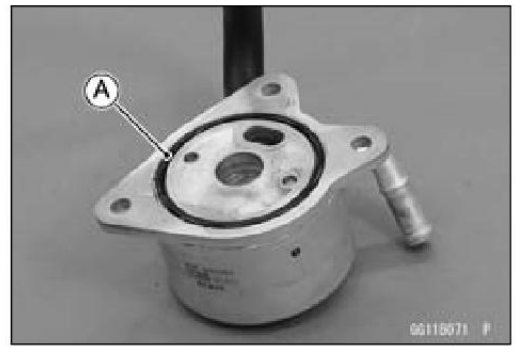



- Slide the clamp [A].
- Disconnect the water hose [B].
- Remove:
  Oil Cooler Bolts [C]
  Oil Cooler [D]




### *Oil Cooler Installation*

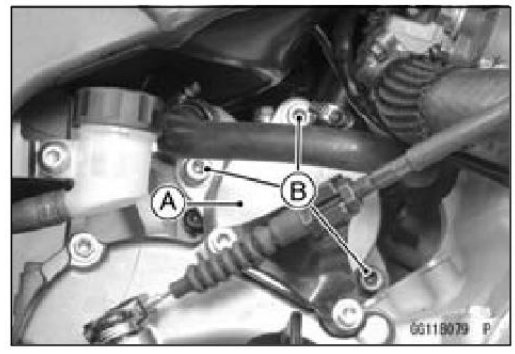
- Replace the O-ring [A] with a new one.




- Install the oil cooler [A].
- Tighten:

  **Torque - Oil Cooler Bolts [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)**

- Install the water hoses and hose clamps (see Cable, Wire, and Hose Routing section (18-2)).

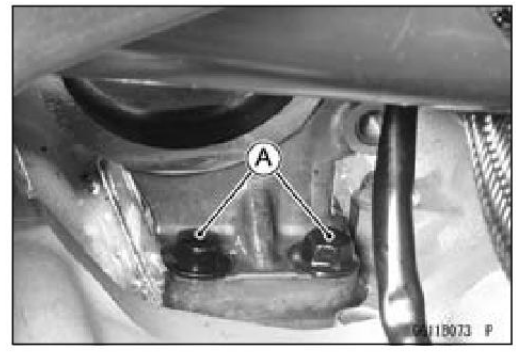



- Pour:
  Coolant (see Coolant Change(2-27))
  Engine Oil (see Engine Oil Change(2-36))
- Install the removed parts.

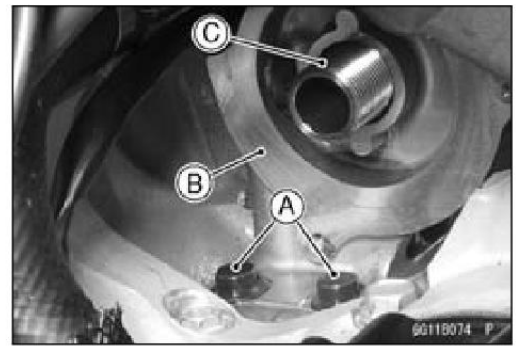
## Oil Cooler

### *Oil Cooler/Oil Filter Case Removal*

● Remove:
Oil Filter (see Oil Filter Replacement(2-37))
Oil Cooler (see Oil Cooler Removal(7-18))
Oil Filter Guard Bolts [A]
Oil Filter Guard [B]



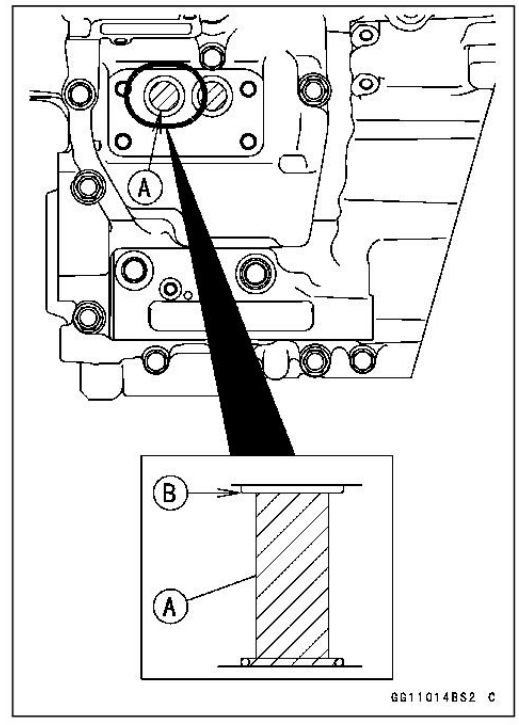

● Remove:
Oil Cooler/Oil Filter Case Bolts [A]




● Remove:
Oil Cooler/Oil Filter Case Bolts [A]
Oil Cooler/Oil Filter Case [B]
○Remove the oil filter pipe [C] as necessary.

### *Oil Cooler/Oil Filter Case Installation*

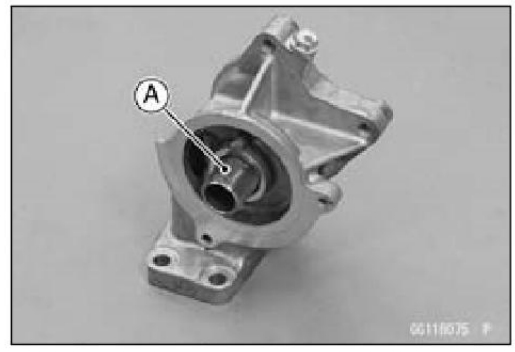
★If the crankcase was disassembled, pour the engine oil into the oil passage [A] until O-ring insert portion [B] of the upper crankcase.



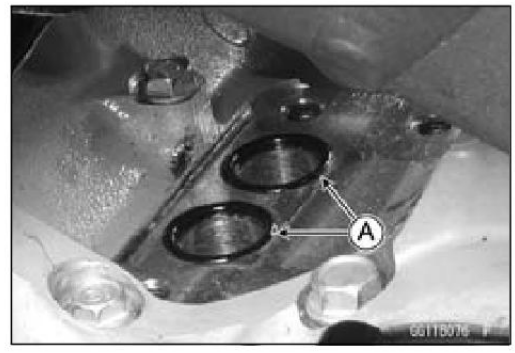
## Oil Cooler

★If the oil filter pipe [A] was removed, install it.
○Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent) to the threads of the oil filter pipe, and tighten it.

**Torque - Oil Filter Pipe: 25 N·m (2.5 kgf·m, 18 ft·lb)**




- Replace the O-rings [A] with new ones.
- Apply grease to the new O-rings.




- Install the oil cooler/oil filter case.
- Replace the oil cooler/oil filter case bolts with new ones, and tighten them.

**Torque - Oil Cooler/Oil Filter Case Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)**

- Install the oil filter guard.
- Replace the oil filter guard bolts with new ones, and tighten them.

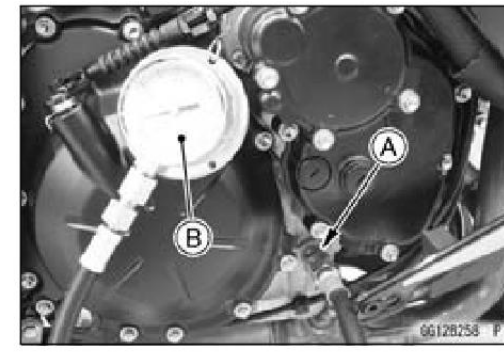
**Torque - Oil Filter Guard Bolts: 4.0 N·m (0.41 kgf·m, 35 in·lb)**

- Install the removed parts.

## Oil Pressure Measurement

### *Oil Pressure Measurement*

- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-9))
  Oil Passage Plug [A]




- Attach the adapter [A] and gauge [B] to the plug hole.

**Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164**
**Oil Pressure Gauge Adapter, PT3/8: 57001 -1233**

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

**Oil Pressure**
**Standard: 93 – 123 kPa (0.95 – 1.25 kgf/cm², 13 – 17.8 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)**

★If the reading is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

★If the reading is much higher than the standard, check the oil passages for clogging.

- Stop the engine.
- Remove the oil pressure gauge and adapter.

**⚠ WARNING**

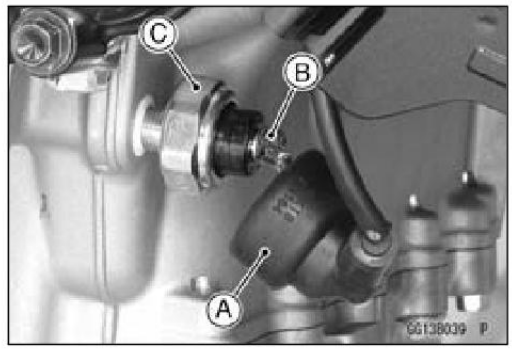
**Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.**

- Replace the oil passage plug with a new one, and install it.

**Torque - Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)**

## Oil Pressure Switch

### *Oil Pressure Switch Removal*




- Drain the engine oil (see Engine Oil Change(2-36)).
- Remove the right lower fairing (see Lower Fairing Removal(15-9)).
- Slide the switch cover [A].
- Remove:
  Switch Terminal Bolt [B]
  Oil Pressure Switch [C]

### *Oil Pressure Switch Installation*

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the threads of the oil pressure switch, and tighten it.

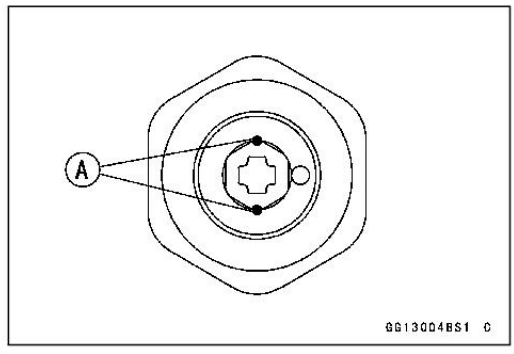
**Sealant - Liquid Gasket, TB1211: 56019-120**

**Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)**

- Apply a thin coat of grease to the both sides of the terminal.

**NOTE**

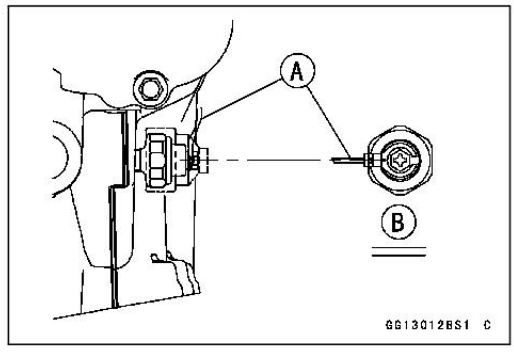
○*The applied grease should not close the two breather holes [A] for switch diaphragm.*




- Install the switch lead [A] as shown.
  Front View [B]
- Tighten:

**Torque - Oil Pressure Switch Terminal Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)**

- Install the switch cover.
- Install the removed parts.



# Engine Removal/Installation

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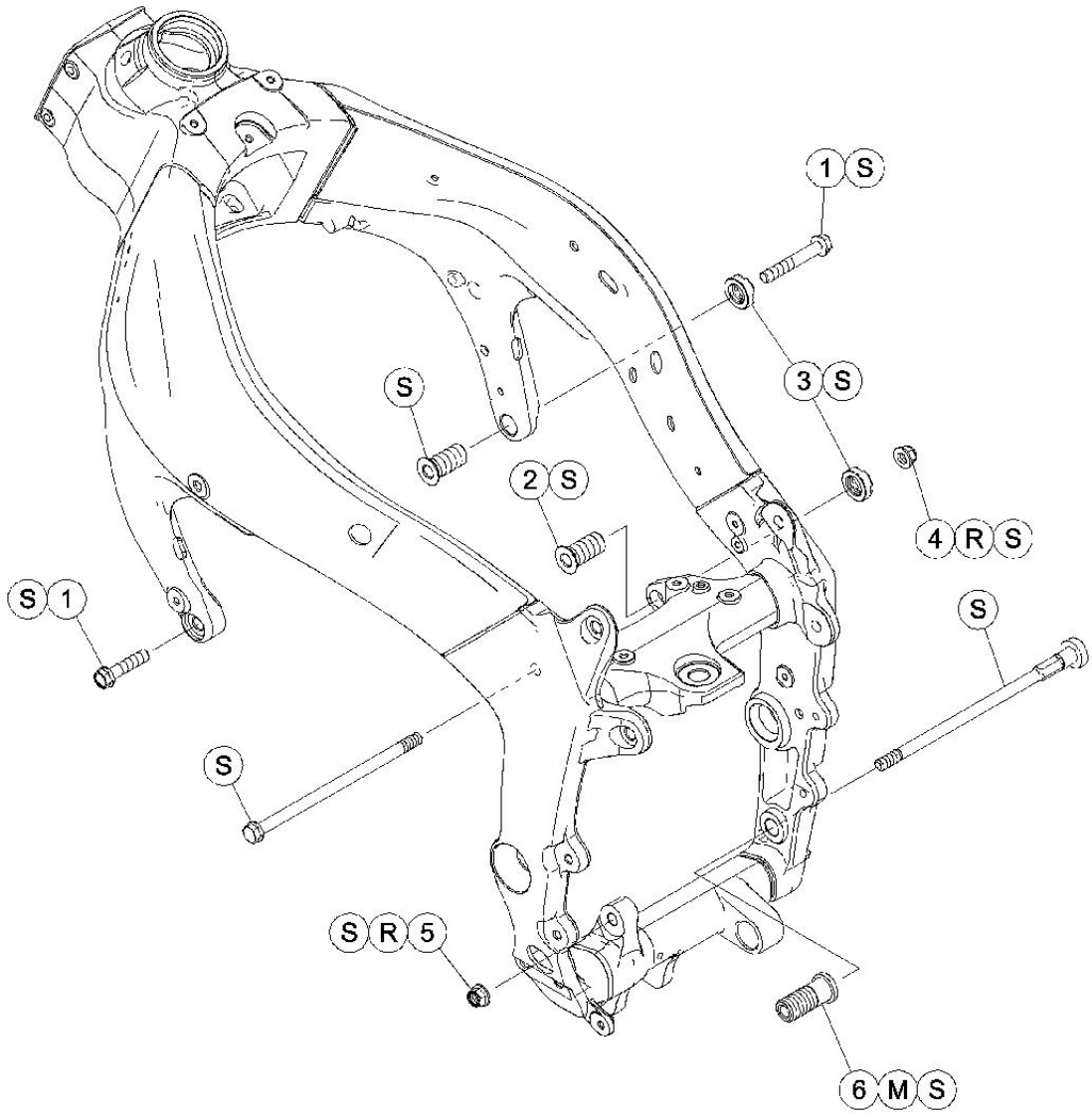
## Exploded View



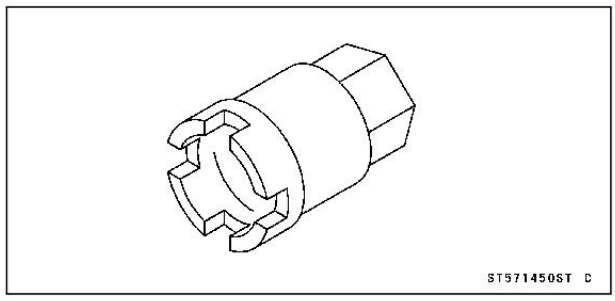
## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Front Engine Mounting Bolts | 45 | 4.6 | 33 | S |
| 2 | Adjusting Collar (Middle) | 10 | 1.0 | 89 in·lb | S |
| 3 | Adjusting Collar Locknuts | 50 | 5.1 | 37 | S |
| 4 | Engine Mounting Nut (Middle) | 45 | 4.6 | 33 | R, S |
| 5 | Engine Mounting Nut (Lower) | 45 | 4.6 | 33 | R, S |
| 6 | Adjusting Collar (Lower) | 10 | 1.0 | 89 in·lb | M, S |

M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

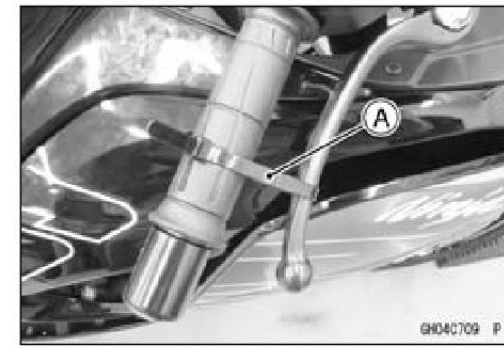
## Special Tool

**Engine Mount Nut Wrench:**
**57001-1450**



## Engine Removal/Installation

### *Engine Removal*




- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

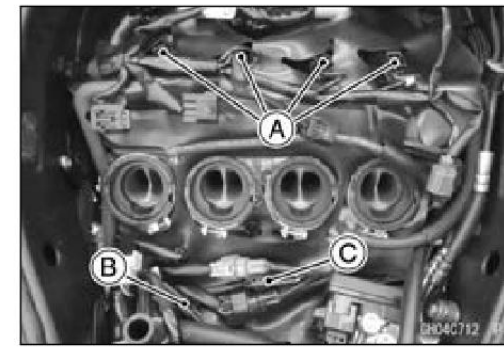
**⚠ WARNING**

**Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.**

***NOTICE***

**Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.**

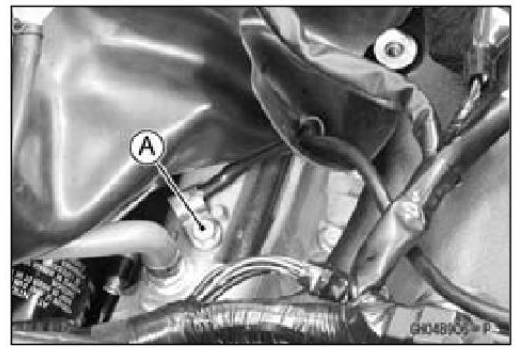
- Drain:
  Engine Oil (see Engine Oil Change(2-36))
  Coolant (see Coolant Change(2-27))
- Remove:
  Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Coolant Reserve Tank (see Coolant Reserve Tank Removal(4-9))
  Fuel Tank (see Fuel Tank Removal(3-38))
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
  Throttle Body Assy (see Throttle Body Assy Removal(3-28))
  Clutch Cable Lower End (see Clutch Cable Removal(6-6))
  Radiator (see Radiator and Radiator Fan Removal(4-12))
  Heat Insulation Plate (see Heat Insulation Plate Removal(4-15))
  Exhaust Pipe (see Exhaust Pipe Removal(5-40))
  Shift Pedal (see Shift Pedal Removal(9-46))
  Engine Sprocket (see Engine Sprocket Removal(11-12))
  Air Switching Valve (see Air Switching Valve Removal(5-12))



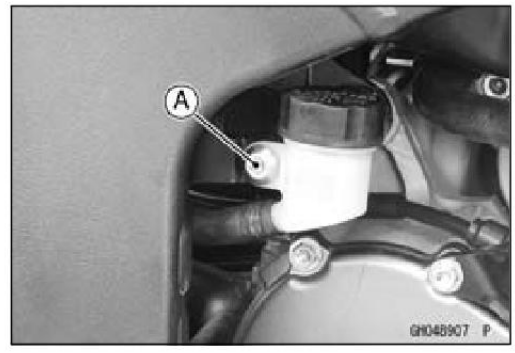

- Disconnect:
  Stick Coil Connectors [A]
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-69))
  Starter Motor Cable (see Starter Motor Removal(16-47))
  Gear Position Switch/Side Stand Switch Connector [B]
  Crankshaft Sensor/Oil Pressure Switch Connector [C]

## Engine Removal/Installation

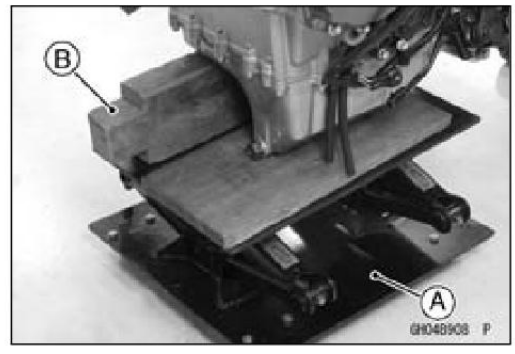
● Remove the engine ground terminal bolt [A].




● Remove:
Bolt [A]



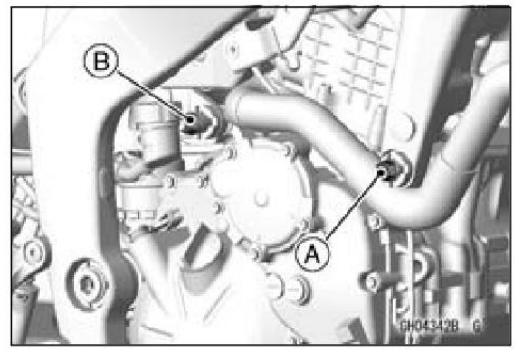

● Support the engine with a suitable stand [A].
○Put a plank [B] onto the suitable stand for engine balance.




● Remove:
Front Engine Mounting Bolt (Both Sides) [A]
Engine Mounting Nut (Middle) [B]
Engine Mounting Nut (Lower)

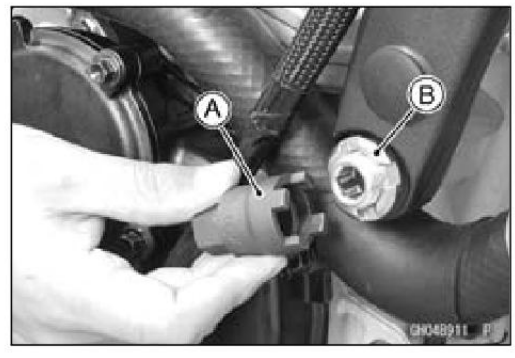
**NOTE**

○*Hold the mounting bolt not to turn when loosening the engine mounting nuts (middle and lower).*



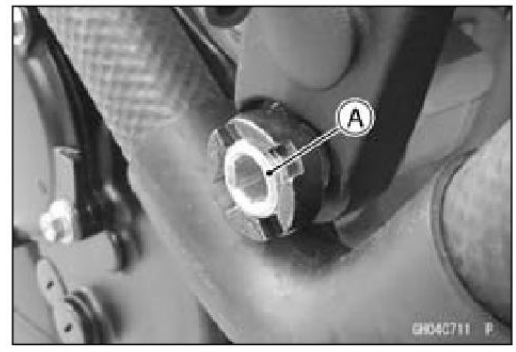

● Using the engine mount nut wrench [A], loosen the locknuts [B].

**Special Tool - Engine Mount Nut Wrench: 57001-1450**



## Engine Removal/Installation

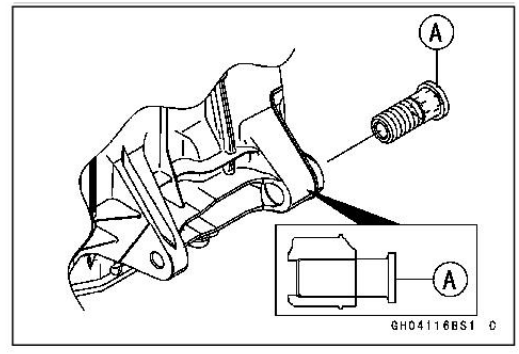
- Using the Hexagon Wrench, turn the adjusting collars [A] counterclockwise to make the gap between the engine and adjusting collar.



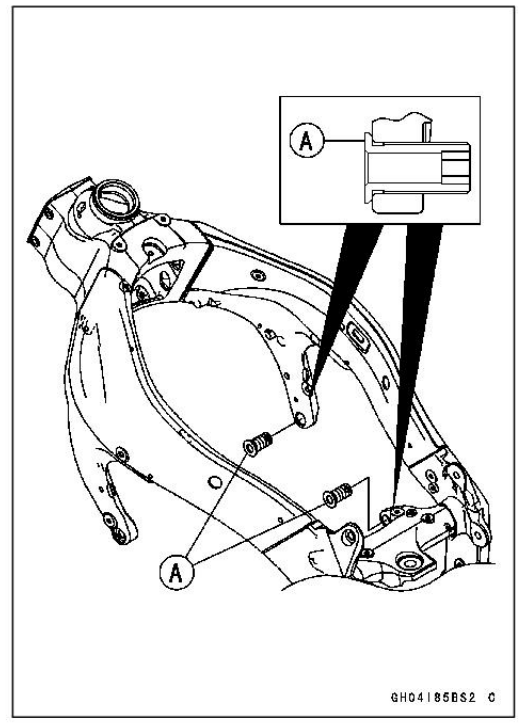

- Turn the engine mounting bolt (lower) clockwise to make the gap between the adjusting collar and frame.
- Pull out the engine mounting bolts.
- Using the stand, take out the engine.

### *Engine Installation*

- Apply molybdenum disulfide grease to the threads of the adjusting collar (lower) [A].
- Install the adjusting collar (lower) to crankcase backside until end of the threads.




- Install the adjusting collars [A] to the frame until end of the threads.



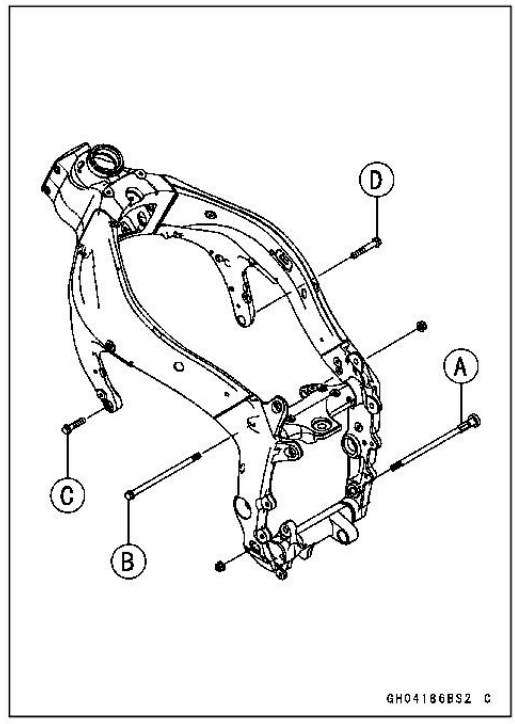

- Replace the engine mounting nuts with new ones.
- Support the engine with a suitable stand.

○Put a plank onto the suitable stand for engine balance.
○Support the engine until all bolts have been tightened.

## Engine Removal/Installation

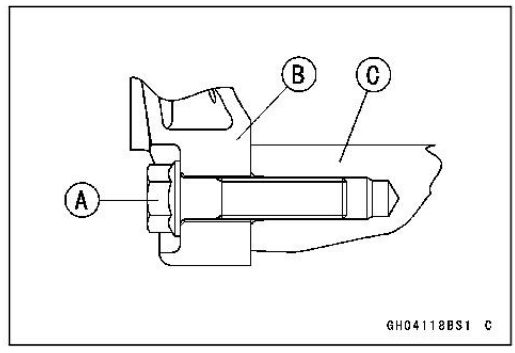
● Install the engine mounting bolts and nuts, following the specified installing sequence.

○First, tighten the following bolts and nuts temporarily.
Engine Mounting Bolt (Lower) [A] and Nut
Engine Mounting Bolt (Middle) [B] and Nut
Front Engine Mounting Bolt (Left Side) [C]
Front Engine Mounting Bolt (Right Side) [D]




○Second, tighten the front engine mounting bolt (left side) [A].
Frame [B]
Engine [C]

**Torque - Front Engine Mounting Bolt (Left Side): 45 N·m (4.6 kgf·m, 33 ft·lb)**




○Third, tighten the engine mounting bolt (lower) [A] counterclockwise until the adjusting collar (lower) [B] touches [C] the frame [D].

○Fourth, turn the adjusting collar (middle) [E] until the adjusting collar touches [C] the engine [F].

○Fifth, tighten the adjusting collars [B] and [E].

**Torque - Adjusting Collar (Lower): 10 N·m (1.0 kgf·m, 89 in·lb)**
**Adjusting Collar (Middle): 10 N·m (1.0 kgf·m, 89 in·lb)**

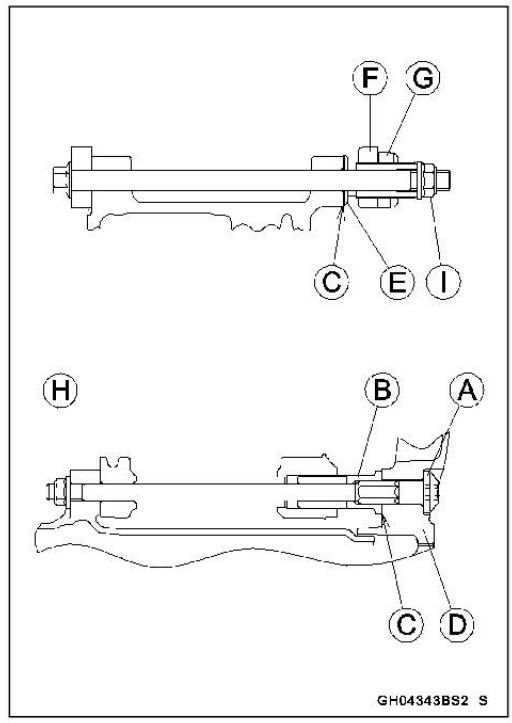
○Sixth, tighten the adjusting collar locknut [G].

**Special Tool - Engine Mount Nut Wrench: 57001-1450**

**Torque - Adjusting Collar Locknut: 50 N·m (5.1 kgf·m, 37 ft·lb)**

○Seventh, tighten the engine mounting nuts (lower and middle).

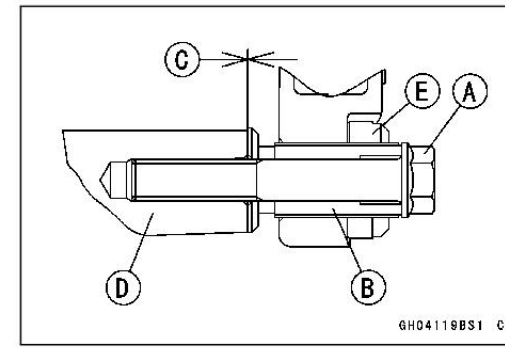
**Torque - Engine Mounting Nut (Lower) [H]: 45 N·m (4.6 kgf·m, 33 ft·lb)**
**Engine Mounting Nut (Middle) [I]: 45 N·m (4.6 kgf·m, 33 ft·lb)**




### NOTE

○*Hold the mounting bolt not to turn when tightening the engine mounting nuts (middle and lower).*

## Engine Removal/Installation




○Eighth, remove the front engine mounting bolt (right side) [A], and turn the adjusting collar [B] until the clearance [C] between the engine [D] and collar come to 0 mm (0 in.).
○Ninth, tighten the adjusting collar locknut [E].

**Special Tool - Engine Mount Nut Wrench: 57001-1450**

**Torque - Adjusting Collar Locknut: 50 N·m (5.1 kgf·m, 37 ft·lb)**

○Lastly, tighten the front engine mounting bolt (right side).

**Torque - Front Engine Mounting Bolt (Right Side): 45 N·m (4.6 kgf·m, 33 ft·lb)**

- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

**Torque - Engine Ground Terminal Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Install the removed parts.
- Adjust:
  Throttle Cables (see Throttle Control System Inspection(2-17))
  Clutch Cable (see Clutch Operation Inspection (2-35))
  Drive Chain (see Drive Chain Slack Inspection(2-40))
- Fill the engine with engine oil (see Engine Oil Change(2-36)).
- Fill the engine with coolant (see Coolant Change(2-27)).

# Crankshaft/Transmission

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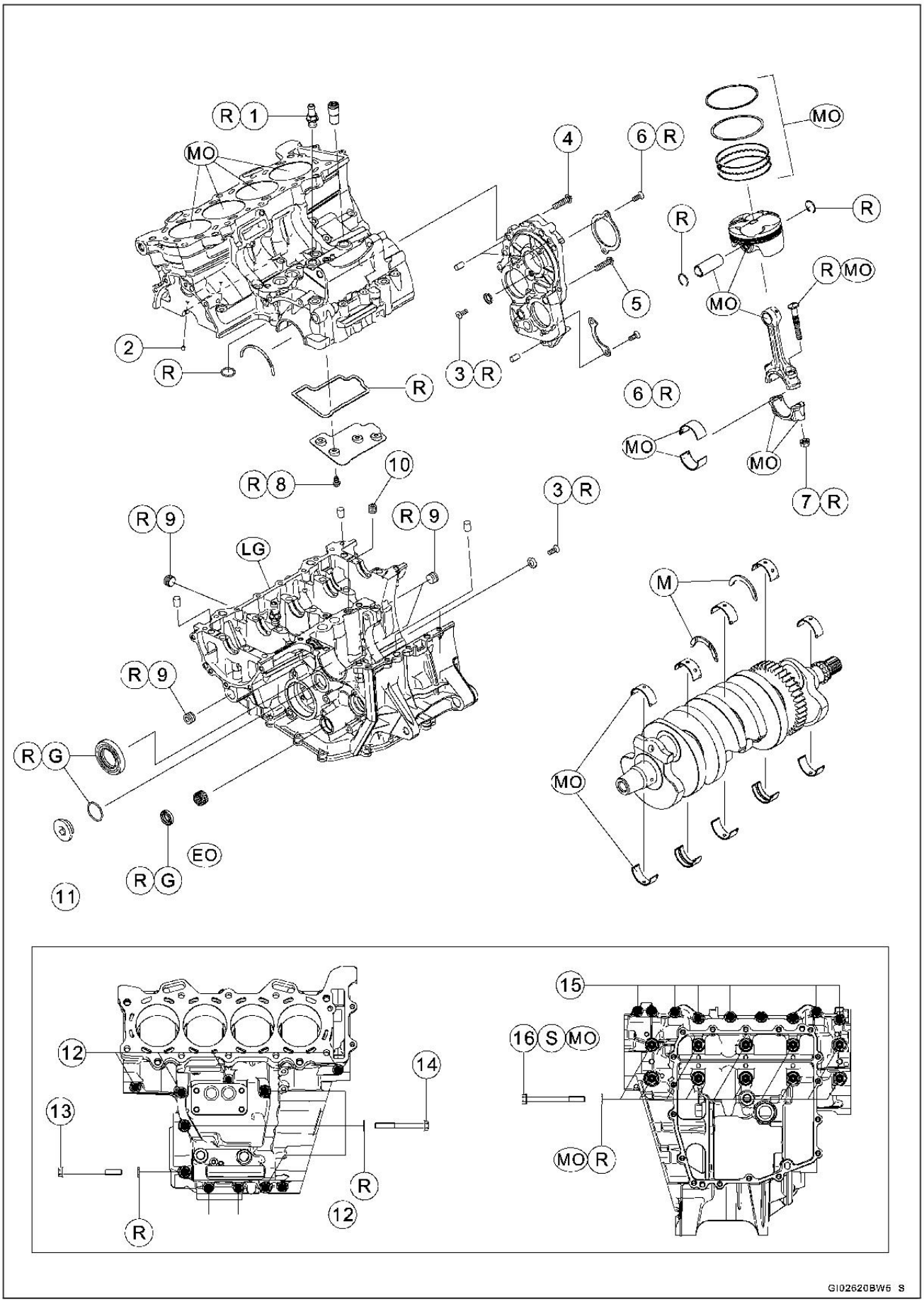
## Exploded View



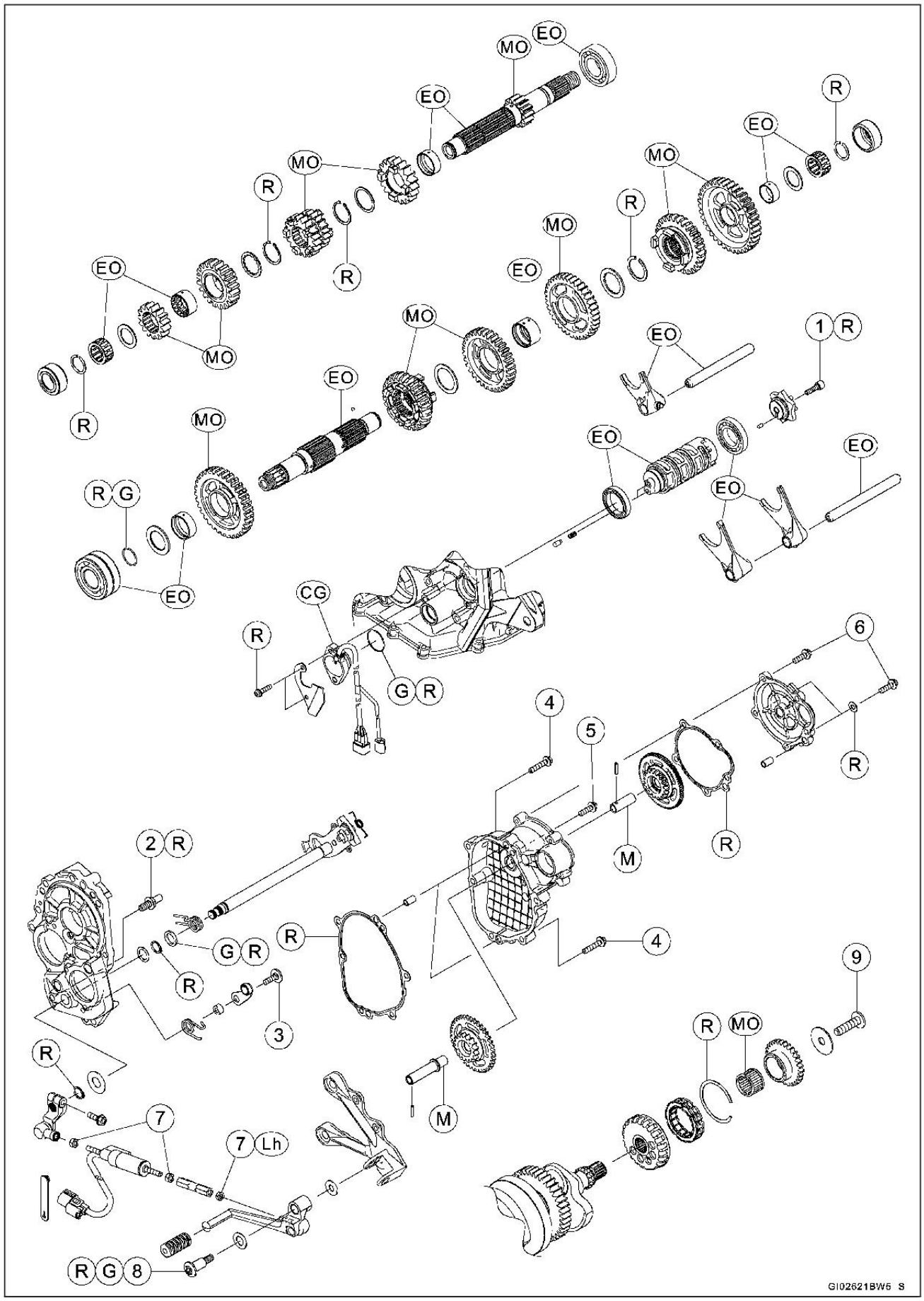

GI02620BW5 S

## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Breather Hose Fitting | 15 | 1.5 | 11 | R |
| 2 | Oil Jet Nozzles | 3.0 | 0.31 | 27 in·lb | |
| 3 | Race Holder Screws | 5.0 | 0.51 | 44 in·lb | R |
| 4 | Transmission Case Bolts (M8) | 20 | 2.0 | 15 | |
| 5 | Transmission Case Bolt (M6) | 10 | 1.0 | 89 in·lb | |
| 6 | Bearing Holder Screws | 5.0 | 0.51 | 44 in·lb | R |
| 7 | Connecting Rod Big End Nuts | see the text | ← | ← | R |
| 8 | Breather Plate Bolts | 10 | 1.0 | 89 in·lb | R |
| 9 | Oil Passage Plugs | 20 | 2.0 | 15 | R |
| 10 | Oil Passage Nozzle | 5.0 | 0.51 | 44 in·lb | |
| 11 | Oil Passage Plug (M25) | 17 | 1.7 | 13 | |
| 12 | Crankcase Bolts (M6, L = 68 mm) | 12 | 1.2 | 106 in·lb | |
| 13 | Crankcase Bolt (M8, L = 90 mm) | 27 | 2.8 | 20 | |
| 14 | Crankcase Bolts (M8, L = 75 mm) | 27 | 2.8 | 20 | |
| 15 | Crankcase Bolts (M6, L = 50 mm) | 12 | 1.2 | 106 in·lb | |
| 16 | Crankcase Bolts (M8, L = 97 mm), First | 15 | 1.5 | 11 | MO, S |
| | Crankcase Bolts (M8, L = 97 mm), Final | 31 | 3.2 | 23 | MO, S |

EO: Apply engine oil.
G: Apply grease.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Shift Drum Cam Holder Bolt | 12 | 1.2 | 106 in·lb | R |
| 2 | Shift Shaft Return Spring Pin | 29 | 3.0 | 21 | R |
| 3 | Gear Positioning Lever Bolt | 12 | 1.2 | 106 in·lb | |
| 4 | Starter Motor Clutch Cover Bolts (L = 30 mm) | 10 | 1.0 | 89 in·lb | |
| 5 | Starter Motor Clutch Cover Bolt (L = 20 mm) | 10 | 1.0 | 89 in·lb | |
| 6 | Idle Gear Cover Bolts | 10 | 1.0 | 89 in·lb | |
| 7 | Quick Shifter Tie-Rod Locknuts | 7.0 | 0.71 | 62 in·lb | Lh (1) |
| 8 | Shift Pedal Bolt | 25 | 2.5 | 18 | G, R |
| 9 | Starter Motor Clutch Bolt | 49 | 5.0 | 36 | |

CG: Apply electrical contact grease (High-temperature diurea grease).
EO: Apply engine oil.
G: Apply grease.
Lh: Left-hand Threads
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts

## Specifications

| Item | Standard | Service Limit |
|---|---|---|
| **Crankcase, Crankshaft/Connecting Rods** | | |
| Connecting Rod Bend | – – – | TIR 0.2/100 mm (0.008/3.94 in.) |
| Connecting Rod Twist | – – – | TIR 0.2/100 mm (0.008/3.94 in.) |
| Connecting Rod Big End Side Clearance | 0.13 – 0.38 mm (0.0051 – 0.0150 in.) | 0.6 mm (0.02 in.) |
| Connecting Rod Big End Bearing Insert/Crankpin Clearance | 0.044 – 0.081 mm (0.0017 – 0.0032 in.) | 0.11 mm (0.0043 in.) |
| Crankpin Diameter: | 29.984 – 30.000 mm (1.1805 – 1.1811 in.) | 29.97 mm (1.180 in.) |
| Marking: | | |
| None | 29.984 – 29.992 mm (1.1805 – 1.18079 in.) | – – – |
| ○ | 29.993 – 30.000 mm (1.18082 – 1.1811 in.) | – – – |
| Connecting Rod Big End Inside Diameter: | 33.000 – 33.016 mm (1.2992 – 1.2998 in.) | 33.04 mm (1.301 in.) |
| Marking: | | |
| None | 33.000 – 33.008 mm (1.2992 – 1.29952 in.) | – – – |
| ○ | 33.009 – 33.016 mm (1.29956 – 1.2998 in.) | – – – |
| Connecting Rod Big End Bearing Insert Thickness: | | |
| Brown | 1.475 – 1.480 mm (0.05807 – 0.05827 in.) | – – – |
| Black | 1.480 – 1.485 mm (0.05827 – 0.05846 in.) | – – – |
| Blue | 1.485 – 1.490 mm (0.05846 – 0.05866 in.) | – – – |
| Connecting Rod Bolt Stretch | (Usable Range) | |
| | 0.28 – 0.38 mm (0.0110 – 0.0150 in.) | – – – |
| Crankshaft Side Clearance | 0.05 – 0.25 mm (0.0020 – 0.0098 in.) | 0.45 mm (0.0177 in.) |
| Crankshaft #3 Main Journal Width | 21.09 – 21.14 mm (0.830 – 0.832 in.) | – – – |
| Crankshaft Runout | TIR 0.02 mm (0.0008 in.) or less | TIR 0.05 mm (0.0020 in.) |
| Crankshaft Main Bearing Insert/Journal Clearance | 0.028 – 0.060 mm (0.0011 – 0.0024 in.) | 0.09 mm (0.0035 in.) |
| Crankshaft Main Journal Diameter: | 30.984 – 31.000 mm (1.2198 – 1.2205 in.) | 30.96 mm (1.2189 in.) |
| Marking: | | |
| None | 30.984 – 30.992 mm (1.2198 – 1.22016 in.) | – – – |
| 1 | 30.993 – 31.000 mm (1.22019 – 1.2205 in.) | – – – |
| Crankcase Main Bearing Inside Diameter: | 34.000 – 34.016 mm (1.3386 – 1.3392 in.) | – – – |
| Marking: | | |
| ○ | 34.000 – 34.008 mm (1.3386 – 1.33889 in.) | – – – |
| None | 34.009 – 34.016 mm (1.33893 – 1.3392 in.) | – – – |

## Specifications

| Item | Standard | Service Limit |
|---|---|---|
| Crankshaft Main Bearing Insert Thickness: | | |
| Brown, Yellow | 1.491 – 1.495 mm (0.05870 – 0.05886 in.) | – – – |
| Black, Green | 1.495 – 1.499 mm (0.05886 – 0.05902 in.) | – – – |
| Blue, Purple | 1.499 – 1.503 mm (0.05902 – 0.05917 in.) | – – – |
| **Cylinders, Pistons** | | |
| Cylinder Inside Diameter | 67.000 – 67.012 mm (2.6378 – 2.6383 in.) | 67.09 mm (2.641 in.) |
| Piston Diameter | 66.960 – 66.975 mm (2.6362 – 2.6368 in.) | 66.81 mm (2.630 in.) |
| Piston/Cylinder Clearance | 0.025 – 0.052 mm (0.0010 – 0.0020 in.) | – – – |
| Piston Ring/Groove Clearance: | | |
| Top | 0.030 – 0.070 mm (0.00118 – 0.00276 in.) | 0.17 mm (0.0067 in.) |
| Second | 0.030 – 0.070 mm (0.00118 – 0.00276 in.) | 0.17 mm (0.0067 in.) |
| Piston Ring Groove Width: | | |
| Top | 0.82 – 0.84 mm (0.0323 – 0.0331 in.) | 0.92 mm (0.0362 in.) |
| Second | 0.82 – 0.84 mm (0.0323 – 0.0331 in.) | 0.92 mm (0.0362 in.) |
| Piston Ring Thickness: | | |
| Top | 0.77 – 0.79 mm (0.030 – 0.031 in.) | 0.70 mm (0.028 in.) |
| Second | 0.77 – 0.79 mm (0.030 – 0.031 in.) | 0.70 mm (0.028 in.) |
| Piston Ring End Gap: | | |
| Top | 0.12 – 0.22 mm (0.0047 – 0.0087 in.) | 0.5 mm (0.02 in.) |
| Second | 0.30 – 0.45 mm (0.0118 – 0.0177 in.) | 0.8 mm (0.03 in.) |
| **Transmission** | | |
| Shift Fork Ear Thickness | 5.9 – 6.0 mm (0.23 – 0.24 in.) | 5.8 mm (0.23 in.) |
| Shifter Groove Width | 6.05 – 6.15 mm (0.238 – 0.242 in.) | 6.3 mm (0.25 in.) |
| Shift Fork Guide Pin Diameter | 5.9 – 6.0 mm (0.23 – 0.24 in.) | 5.8 mm (0.23 in.) |
| Shift Drum Groove Width | 6.05 – 6.20 mm (0.238 – 0.244 in.) | 6.3 mm (0.25 in.) |

## Specifications

### Connecting Rod Big End Bearing Insert Selection

| Con-rod Big End Inside Diameter Marking | Crankpin Diameter Marking | Bearing Insert | |
|---|---|---|---|
| | | Size Color | Part Number |
| None | ○ | Brown | 92139-0167 |
| None | None | Black | 92139-0166 |
| ○ | ○ | | |
| ○ | None | Blue | 92139-0165 |

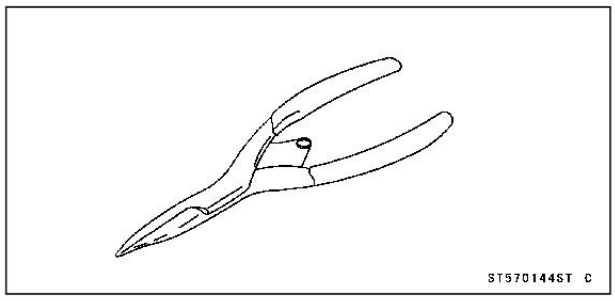
### Crankshaft Main Bearing Insert Selection

| Crankcase Main Bearing Inside Diameter Marking | Crankshaft Main Journal Diameter Marking | Bearing Insert* | | |
|---|---|---|---|---|
| | | Size Color | Part Number | Journal Nos. |
| ○ | 1 | Brown | 92139-0247 | 1, 5 |
| | | | 92139-0250 | 2, 4 |
| | | Yellow | 92139-0253 | 3 |
| None | 1 | Black | 92139-0246 | 1, 5 |
| | | | 92139-0249 | 2, 4 |
| | | Green | 92139-0252 | 3 |
| ○ | None | Black | 92139-0246 | 1, 5 |
| | | | 92139-0249 | 2, 4 |
| | | Green | 92139-0252 | 3 |
| None | None | Blue | 92139-0245 | 1, 5 |
| | | | 92139-0248 | 2, 4 |
| | | Purple | 92139-0251 | 3 |

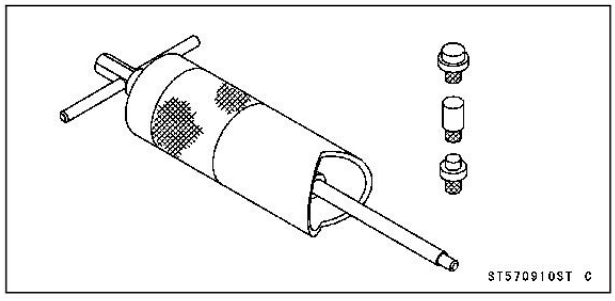
*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

## Special Tools and Sealants

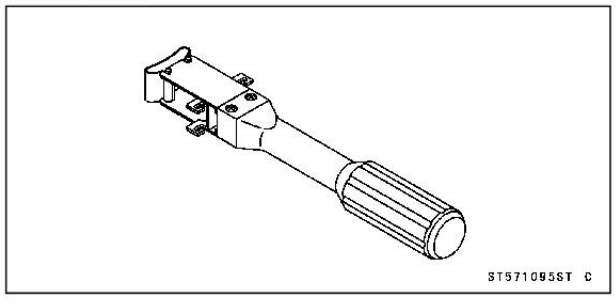
**Outside Circlip Pliers:**
**57001-144**



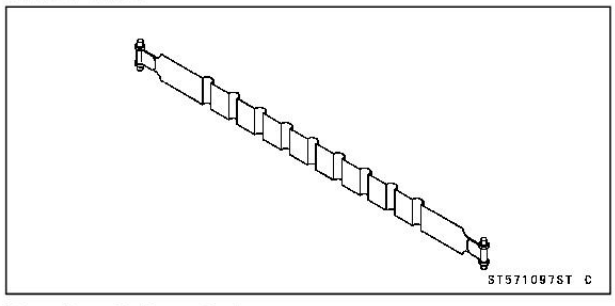

**Piston Pin Puller Assembly:**
**57001-910**



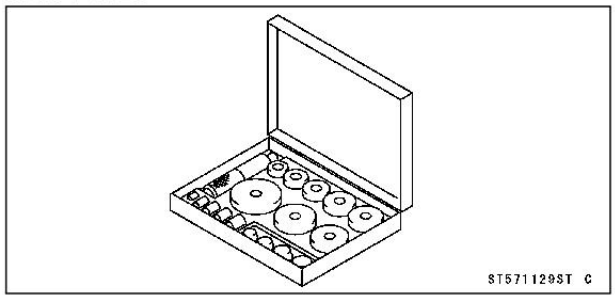

**Piston Ring Compressor Grip:**
**57001-1095**



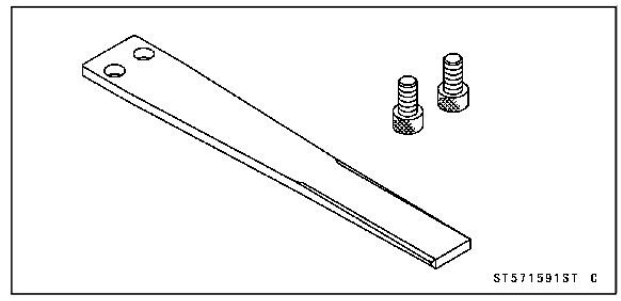

**Piston Ring Compressor Belt, $\phi$67 – $\phi$79:**
**57001-1097**



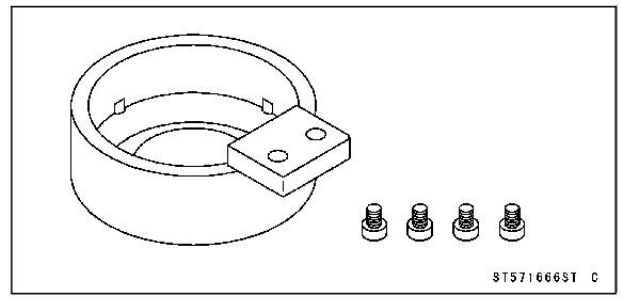

**Bearing Driver Set:**
**57001-1129**



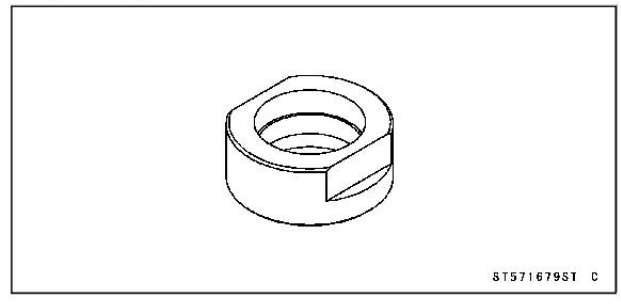

**Grip:**
**57001-1591**



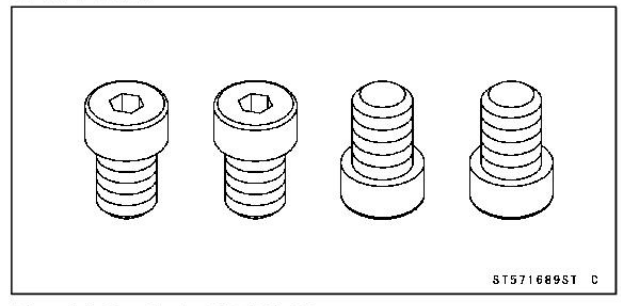

**Rotor Holder:**
**57001-1666**



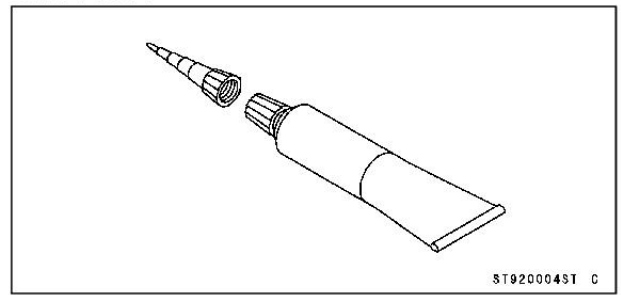

**Stopper:**
**57001-1679**




**Rotor Holder Attachment:**
**57001-1689**

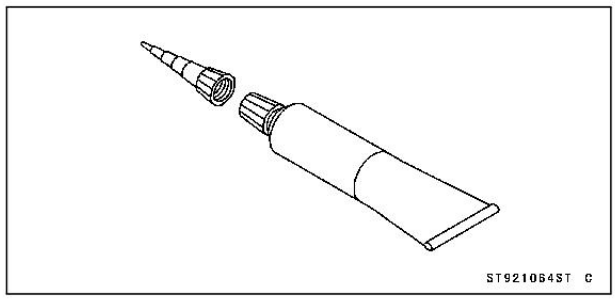



**Liquid Gasket, TB1211F:**
**92104-0004**



## Special Tools and Sealants

**Liquid Gasket, TB1216B:**
**92104-1064**



## Crankcase

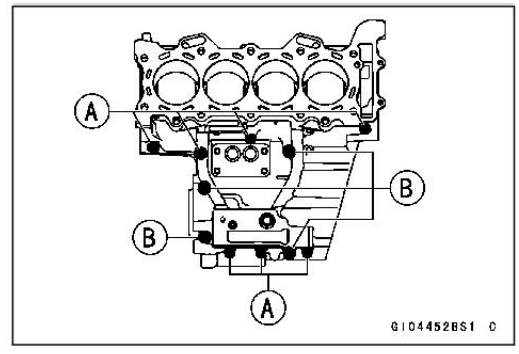
### *Crankcase Splitting*

- Remove the engine (see Engine Removal(8-5)).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:

  Crankshaft Sensor (see Crankshaft Sensor Removal(16-39))
  Starter Motor Clutch (see Starter Motor Clutch Removal(9-34))
  Cylinder Head (see Cylinder Head Removal(5-25))
  Starter Motor (see Starter Motor Removal(16-47))
  Clutch (see Clutch Removal(6-13))
  Oil Pump (see Oil Pump Removal(7-14))
  Alternator Rotor (see Alternator Rotor Removal(16-33))
  Oil Cooler/Oil Filter Case (see Oil Cooler/Oil Filter Case Removal(7-19))
  Oil Pan (see Oil Pan Removal(7-10))
  Oil Screen (see Oil Pressure Relief Valve Removal(7-11))
  External Shift Mechanism (see External Shift Mechanism Removal(9-47))
  Transmission Assy (see Transmission Assy Removal(9-37))

- Remove the upper crankcase bolts, following the specified sequence.

○Firstly, loosen the M6 bolts [A].
○Secondly, loosen the M8 bolts [B].

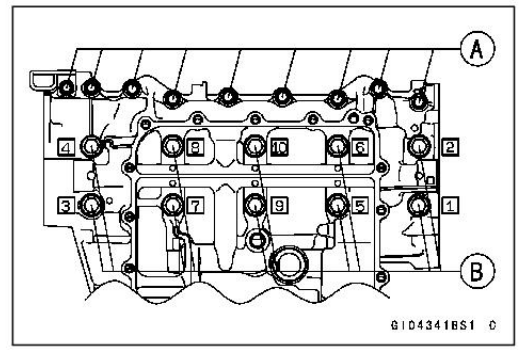



- Remove the lower crankcase bolts, following the specified sequence.

○Firstly, loosen the M6 bolts [A].
○Secondly, loosen the M8 bolts [B] as shown sequence [1 – 10].

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.

○Take care not to damage the crankcase.



## Crankcase

### *Crankcase Assembly*

| *NOTICE* |
| --- |
| **The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.** |

● With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

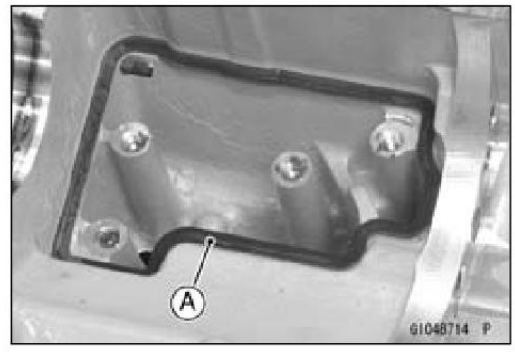
| ⚠ WARNING |
| --- |
| **Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.** |

● Using compressed air, blow out the oil passages in the crankcase halves.

**Upper Crankcase Assembly**

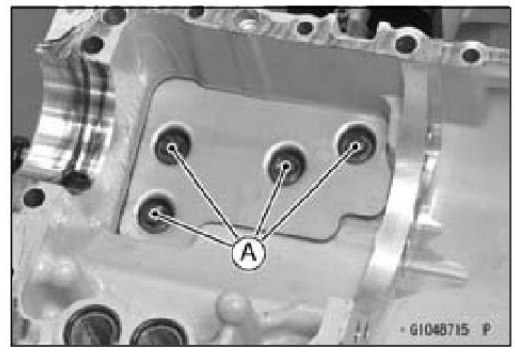
● When installing the breather plate note the following.

○Replace the gasket [A] with a new one.




○Replace the breather plate bolts [A] with new ones, and tighten them.

**Torque - Breather Plate Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**



## Crankcase

- Press the fitting [A] until it is bottomed.

  **Special Tool - Bearing Driver Set: 57001-1129**

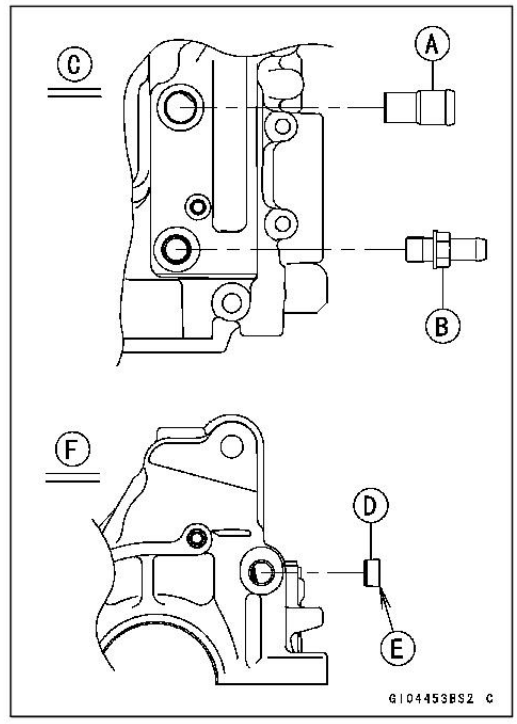
- Replace the breather hose fitting [B] with a new one, and tighten it.

  View from Upside [C]

  **Torque - Breather Hose Fitting: 15 N·m (1.5 kgf·m, 11 ft·lb)**

- Install the plug [D] so that the plug surface [E] is flush with the end of the hole.

  View from Left Side [F]



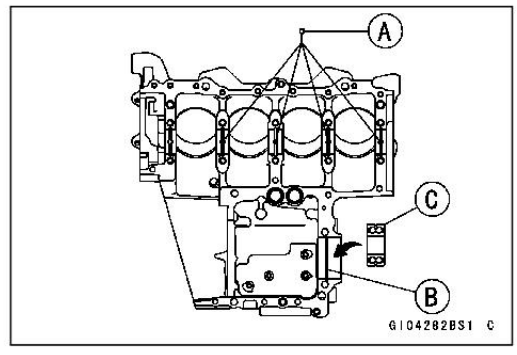

- Install the oil jet nozzles [A], and tighten them.

  **Torque - Oil Jet Nozzles: 3.0 N·m (0.31 kgf·m, 27 in·lb)**

- Install:

  Position Ring [B]

  Ball Bearing [C]




### Lower Crankcase Assembly

- Press the race [A] so that the big stepped side faces to inside of the crankcase until it is bottomed.
- Install the race holder [B] as shown.
- Replace the race holder screw [C] with a new one.
- Tighten:

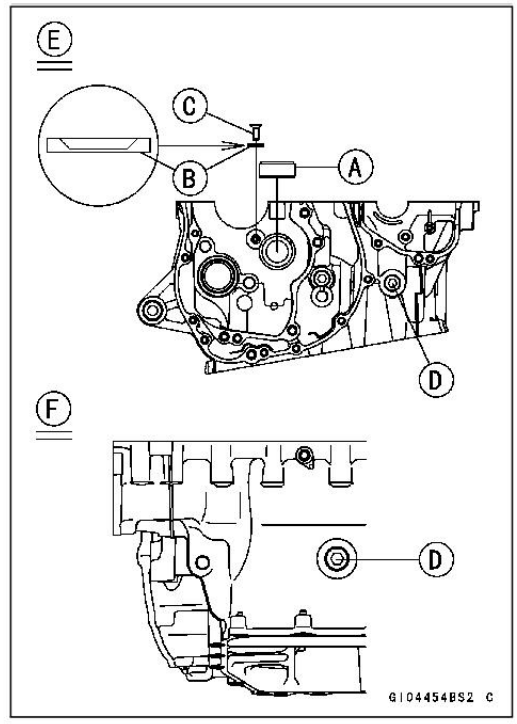
  **Torque - Race Holder Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

- Replace the oil passage plugs [D] with new ones.
- Tighten:

  **Torque - Oil Passage Plugs: 20 N·m (2.0 kgf·m, 15 ft·lb)**

  View from Right Side [E]

  View from Front Side [F]

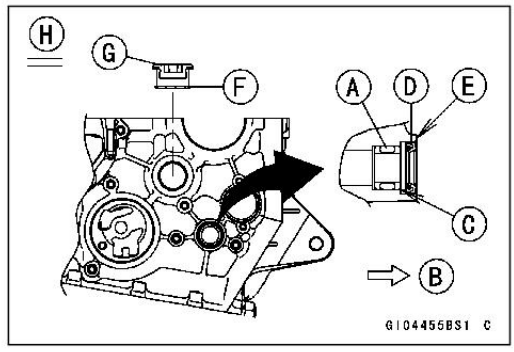


## Crankcase

- Press the new needle bearing [A] for the shift shaft so that its marked side faces outside [B] and its surface [C] is flush with the end of the hole.
- Install the new oil seal [D] so that its surface [E] is flush with the end of the hole.
- Apply grease to the oil seal lips.
- Replace the O-ring [F] with a new one.
- Apply grease to the O-ring.
- Tighten:

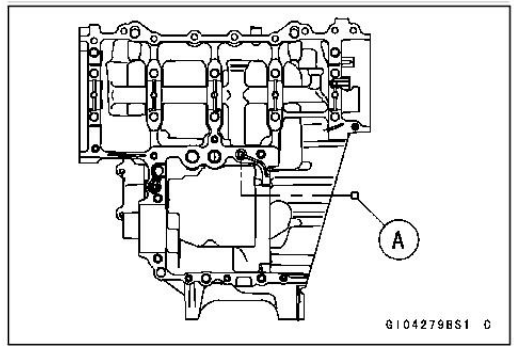
**Torque - Oil Passage Plug (M25) [G]: 17 N·m (1.7 kgf·m, 13 ft·lb)**

View from Left Side [H]




- Install the oil passage nozzle [A], and tighten it.

**Torque - Oil Passage Nozzle: 5.0 N·m (0.51 kgf·m, 44 in·lb)**



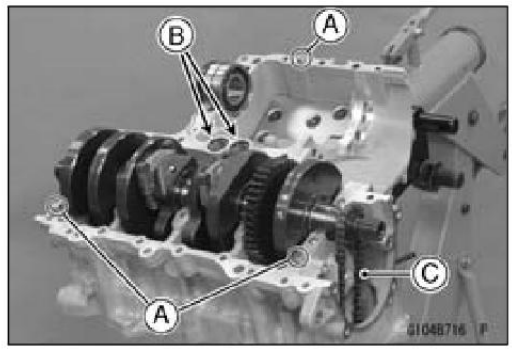

**Crankcase Halves Assembly**

- Install:

Crankshaft (see Crankshaft Installation(9-17))
Connecting Rods (see Connecting Rod Installation(9-19))
Dowel Pins [A]
O-rings [B]

- Before fitting the lower case on the upper case, check the following.

○Be sure to hang the camshaft chain [C] on the crankshaft.



## Crankcase

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket, coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

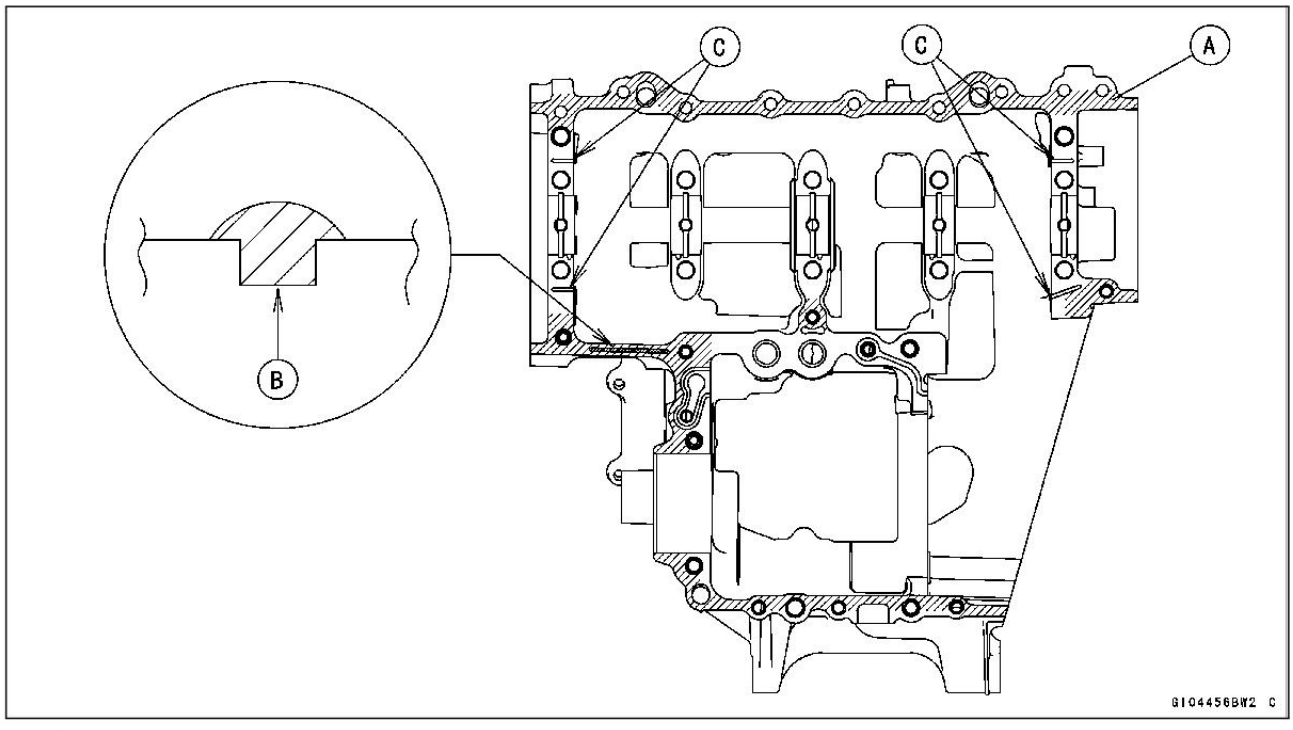
**Sealant - Liquid Gasket, TB1216B: 92104-1064**

**NOTE**

○*Especially, apply a sealant so that it shall be filled up on the groove [B].*

○*Do not apply liquid gasket to the inside of the grooves [C].*

| ***NOTICE*** |
| --- |
| **Do not apply liquid gasket around the crankshaft main bearing inserts and oil passage.** |




- Fit the lower crankcase half to the upper crankcase half.

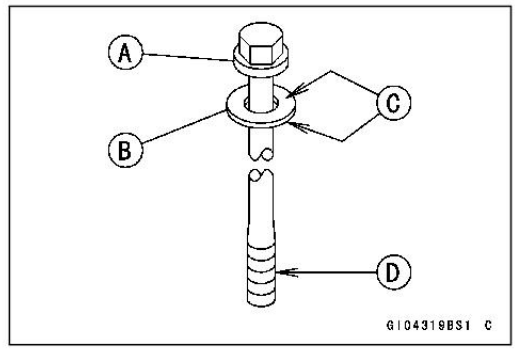
**NOTE**

○*Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crankcase half is applied.*

○*Moreover fit the case and tighten the bolts just after application of the liquid gasket.*

## Crankcase

- The M8 bolts [A] has a copper plated washer [B], replace it with a new one.
- Apply molybdenum disulfide oil solution to both sides [C] of the washers and threads [D] of M8 bolts.



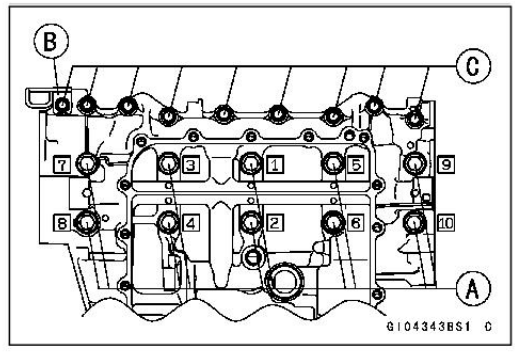

- Tighten the lower crankcase bolts using the following steps.

○Following the sequence numbers on the lower crankcase half, tighten M8 bolts [1 – 10] with copper plated washers.

**Torque - Crankcase Bolts (M8, L = 97 mm) [A]:**
**First: 15 N·m (1.5 kgf·m, 11 ft·lb)**
**Final: 31 N·m (3.2 kgf·m, 23 ft·lb)**

○Install the clamp [B], and tighten the M6 bolts [C].

**Torque - Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)**

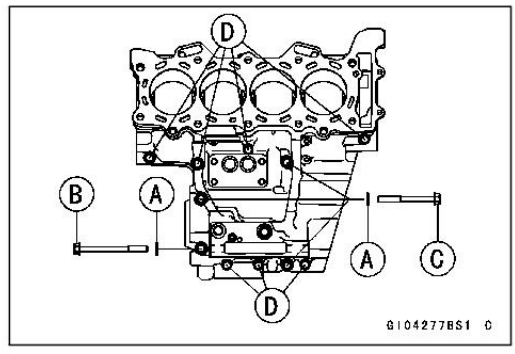



- Replace the M8 bolt washers [A] with new ones.
- Tighten the M8 bolts with washers.

**Torque - Crankcase Bolts (M8, L = 90 mm) [B]: 27 N·m (2.8 kgf·m, 20 ft·lb)**
**Crankcase Bolts (M8, L = 75 mm) [C]: 27 N·m (2.8 kgf·m, 20 ft·lb)**

- Tighten the M6 bolts [D].

**Torque - Crankcase Bolts (M6): 12 N·m (1.2 kgf·m, 106 in·lb)**




- After tightening all crankcase bolts, check the following items.

○Wipe up the liquid gasket that seeps out around the crankcase mating surface.

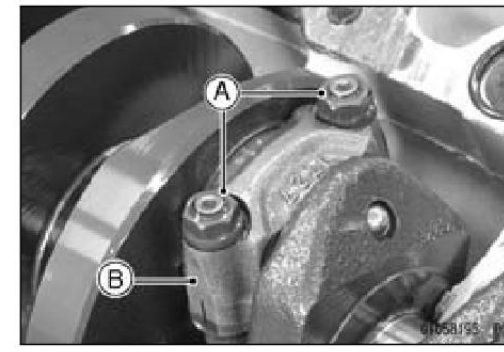
○Crankshaft turns freely.

- Install the removed parts.

## Crankshaft and Connecting Rods

### *Crankshaft Removal*

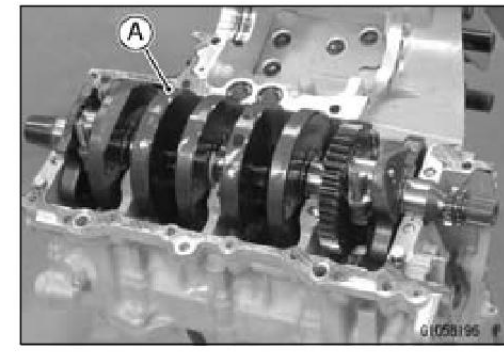
- Split the crankcase (see Crankcase Splitting(9-11)).
- Remove:
  Connecting Rod Big End Nuts [A]
  Connecting Rod Big End Caps [B]




**NOTE**

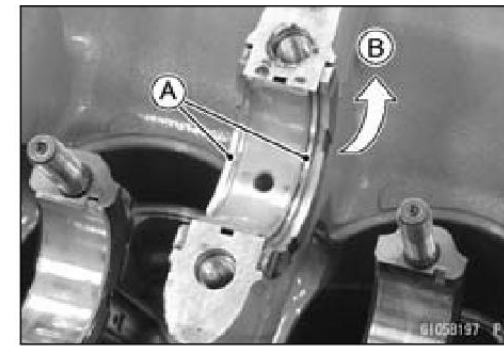
○*Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.*

- Remove the camshaft chain and crankshaft [A].




- Remove the thrust washers [A] from the #3 main journal of the upper crankcase half as follows.

○Slide [B] the thrust washers upward and remove them.




### *Crankshaft Installation*

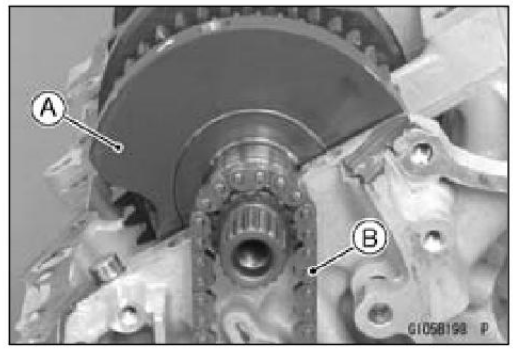
**NOTE**

○*If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing/Crankshaft Main Bearing Insert Selection in the Specifications.*

| *NOTICE* |
| --- |
| **If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.** |

## Crankshaft and Connecting Rods

- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft [A] with the camshaft chain [B] hanging on it.
- Install the connecting rod big end caps (see Connecting Rod Installation(9-19)).



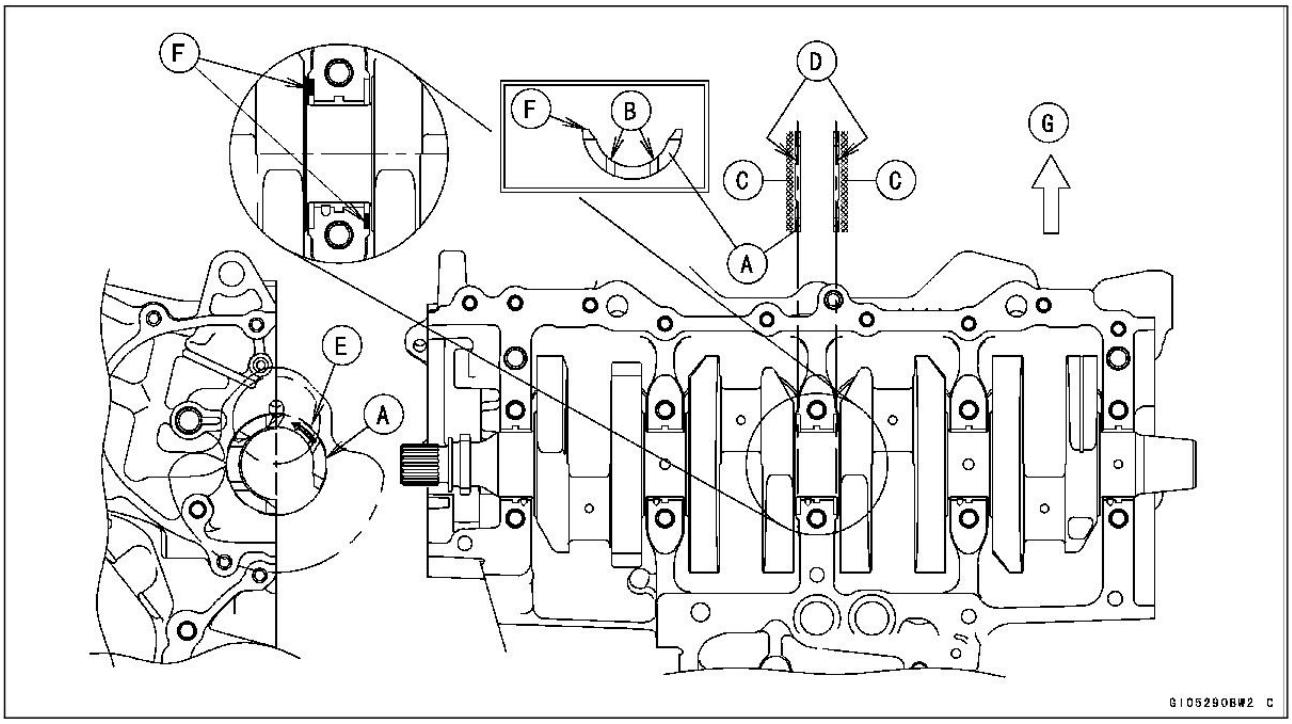

**NOTE**

○*The thrust washer [A] has oil grooves [B] on the one side.*

○*The thrust washers are identical.*

- Apply molybdenum disulfide grease [C] to the oil groove side [D] of the thrust washers.
- Slide [E] the thrust washer of the one side into the groove of the #3 main journal so that the oil grooves face outward.
- Move the crankshaft to the left or right, and then slide the thrust washer of the other side into the groove of the #3 main journal in the same way.
- After installation, confirm that the blue-painted edges [F] of the thrust washers are positioned as shown.

Front [G]

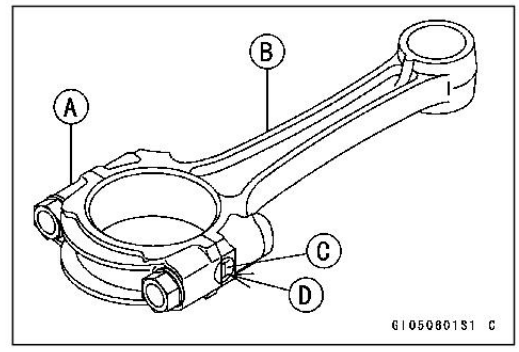



### *Connecting Rod Removal*

- Refer to the Piston Removal (see Piston Removal(9-28)).

## Crankshaft and Connecting Rods

### *Connecting Rod Installation*



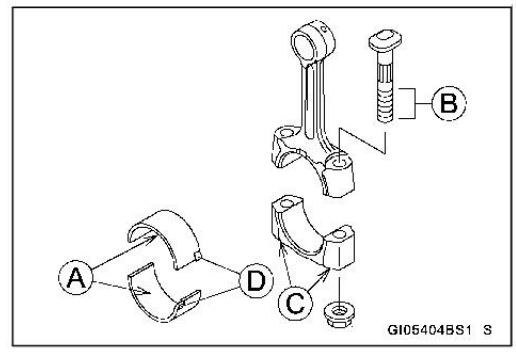

**NOTICE**

**To minimize vibration, the connecting rods should have the same weight mark.**

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "○" or no mark

**NOTICE**

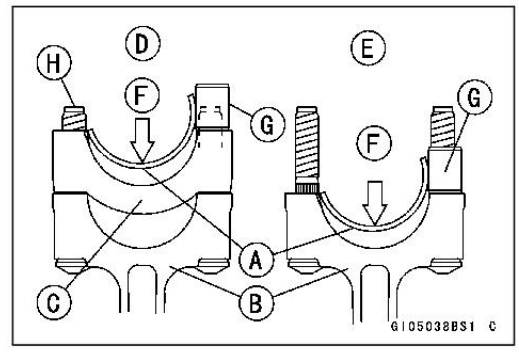
**If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.**




- Apply molybdenum disulfide oil solution to the inner surface of the upper and lower bearing inserts [A].
- Apply molybdenum disulfide oil solution to the threads [B] and seating surface [C] of the big end cap.
- Install the inserts so that their nails [D] are on the same side and fit them into the recess of the connecting rod and cap.

**NOTICE**

**Wrong application of oil and grease could cause bearing damage.**




○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.
Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]

- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod, aligning the weight and diameter marks.

- Install the crankshaft (see Crankshaft Installation(9-17)).
- Install each connecting rod on its original crankpin.

○The connecting rod big end is bolted using the "plastic region fastening method."
○This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.
○There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

## Crankshaft and Connecting Rods

**NOTICE**

**The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.**

**NOTICE**

**Be careful not to overtighten the nuts.**
**The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.**

(1) Bolt Length Measurement Method

- Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

**⚠ WARNING**

**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.**

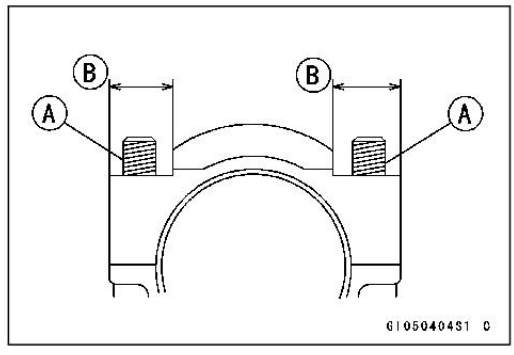
**NOTICE**

**Immediately dry the bolts and nuts with compressed air after cleaning. Clean and dry the bolts and nuts completely.**

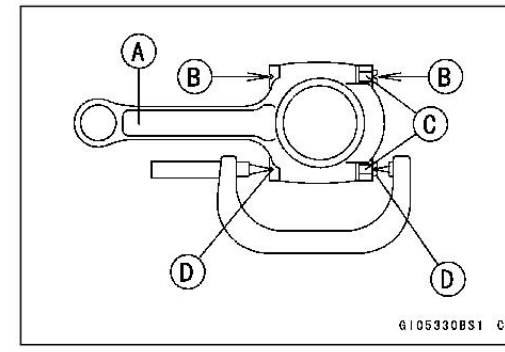
- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assembly was replaced, use the bolts and nuts attached to the new connecting rod assembly.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods



## Crankshaft and Connecting Rods




- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [A]
  Dent here with a punch [B].
  Nuts [C]
  Fit micrometer pins into dents [D].
- Tighten the big end nuts until the bolt elongation reaches the length specified as follows.

Bolt Length after tightening – Bolt Length before tightening = Bolt Stretch

**Connecting Rod Bolt Stretch**
**Usable Range: 0.28 – 0.38 mm (0.0110 – 0.0150 in.)**

- Check the length of the connecting rod bolts.

★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

(2) Rotation Angle Method

★If you don't have a point micrometer, you may tighten the nuts using the "Rotation Angle Method."

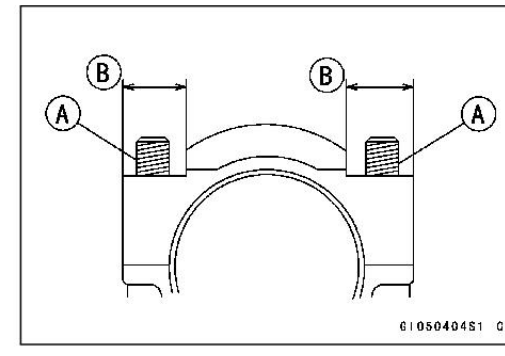
- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti-rust solution.

**⚠ WARNING**

**Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.**

***NOTICE***

**Immediately dry the bolts and nuts with compressed air after cleaning.**
**Clean and dry the bolts and nuts completely.**




- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assembly was replaced, use the bolts and nuts attached to the new connecting rod assembly.

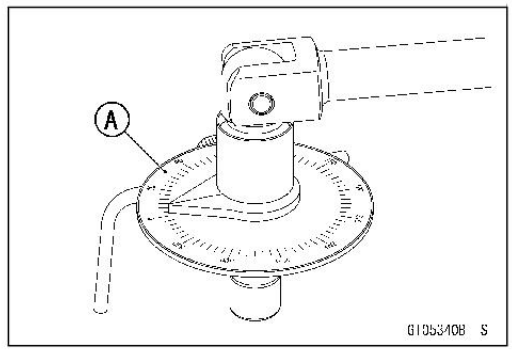
- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Nuts and Bolts
  Seating Surfaces [B] of Nuts and Connecting Rods

## Crankshaft and Connecting Rods

- First, tighten the nuts with **12.8 N·m (1.3 kgf·m, 113 in·lb)** of torque.
- Next, tighten the nuts **175°**.

○Using a torque angle gauge [A], tighten the nuts specified angle.

| Connecting Rod Assy | Bolt | Nut | Torque + Angle N·m (kgf·m, in·lb) |
|---|---|---|---|
| New | Attached to new con-rod | Attached to new con-rod | 12.8 (1.3, 113) + 175° |
| | New | New | |
| Used | Replace the bolts with new ones | Replace the nuts with new ones | 12.8 (1.3, 113) + 175° |



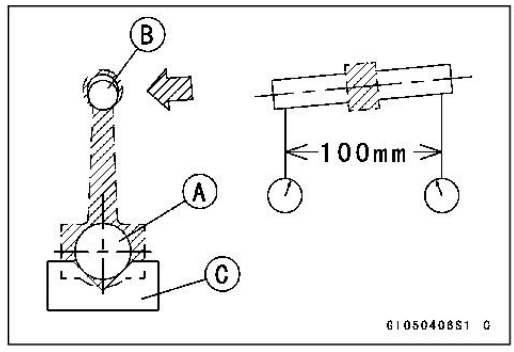

### *Crankshaft/Connecting Rod Cleaning*

- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

### *Connecting Rod Bend Inspection*

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.

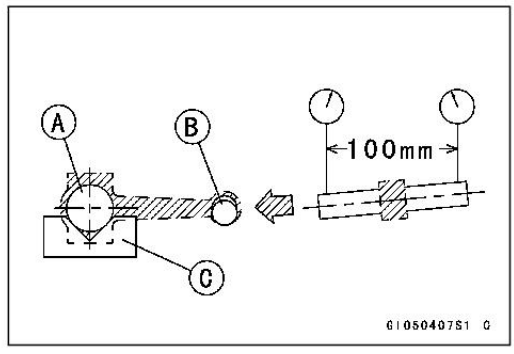



**Connecting Rod Bend**
**Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)**

### *Connecting Rod Twist Inspection*

- With the big-end arbor [A] still on V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

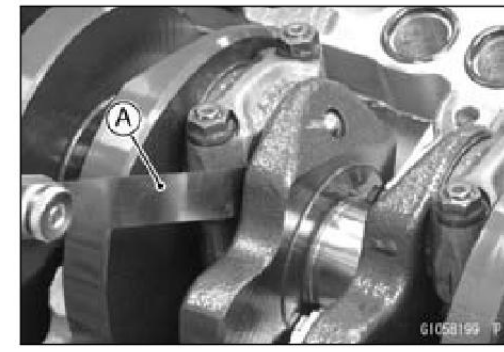
★If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.




**Connecting Rod Twist**
**Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)**

## Crankshaft and Connecting Rods

### *Connecting Rod Big End Side Clearance Inspection*



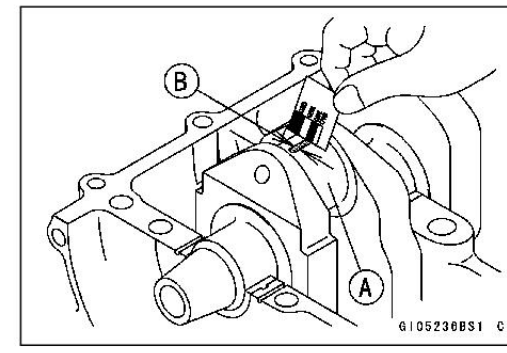

- Measure connecting rod big end side clearance.

○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

**Connecting Rod Big End Side Clearance**
**Standard: 0.13 – 0.38 mm (0.0051 – 0.0150 in.)**
**Service Limit: 0.6 mm (0.02 in.)**

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If the clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

### *Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection*




- Remove the connecting rod big end (see Connecting Rod Removal(9-18)).
- Cut strips of plastigage (press gauge) to crankpin width. Place a strip on the crankpin parallel to the crankshaft installed in the correct position.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation(9-19)).

**NOTE**

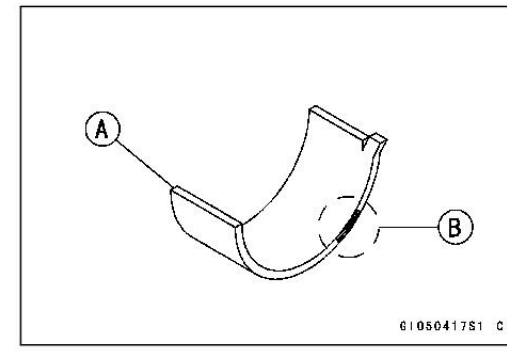
○*Do not move the connecting rod and crankshaft during clearance measurement.*

- Remove the connecting rod big end again, measure each clearance between the bearing insert and crankpin [A] using plastigage (press gauge) [B].

***NOTICE***

**After measurement, replace the connecting rod bolts and nuts.**

**Connecting Rod Big End Bearing Insert/Crankpin Clearance**
**Standard: 0.044 – 0.081 mm (0.0017 – 0.0032 in.)**
**Service Limit: 0.11 mm (0.0043 in.)**




★If the clearance is within the standard, no bearing replacement is required.

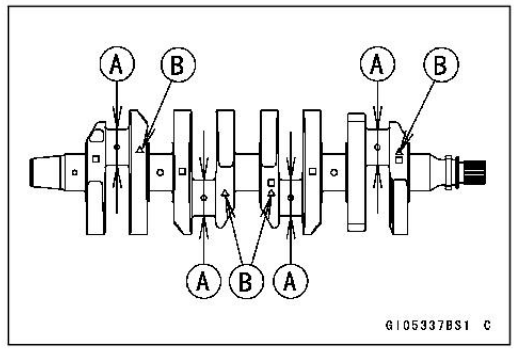
★If the clearance is between 0.082 mm (0.0032 in.) and the service limit (0.11 mm, 0.0043 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpins.

**Crankpin Diameter**
**Standard: 29.984 – 30.000 mm (1.1805 – 1.1811 in.)**
**Service Limit: 29.97 mm (1.180 in.)**

## Crankshaft and Connecting Rods

★If any crankpin has worn past the service limit, replace the crankshaft with a new one.
★If the measured crankpin diameters [A] are not less than the service limit, but do not coincide with the original diameter markings [B] on the crankshaft, make new marks on it.




**Crankpin Diameter Marks**
**None 29.984 – 29.992 mm (1.1805 – 1.18079 in.)**
**○ 29.993 – 30.000 mm (1.18082 – 1.1811 in.)**

△: Crankpin Diameter Marks, "○" or no mark.

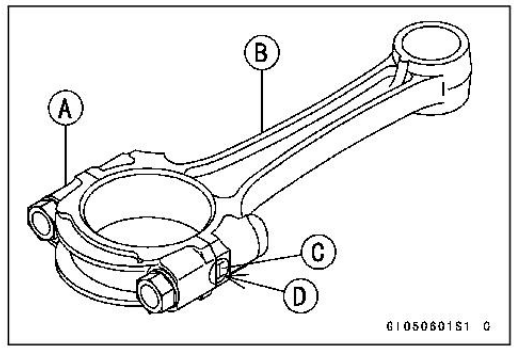
- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation(9-19)).

**NOTE**

○*The mark already on the big end should almost coincide with the measurement.*

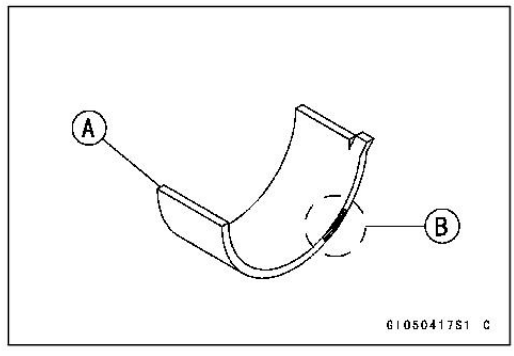
**Connecting Rod Big End Inside Diameter Marks**
**None 33.000 – 33.008 mm (1.2992 – 1.29952 in.)**
**○ 33.009 – 33.016 mm (1.29956 – 1.2998 in.)**

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark




- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

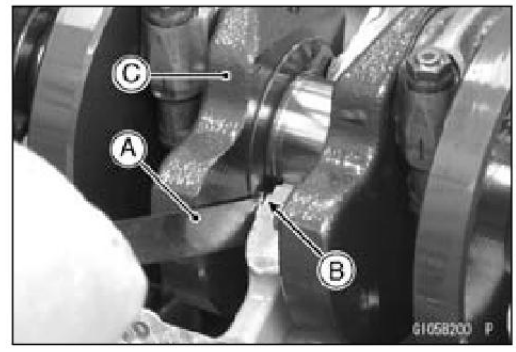
| Con-rod Big End Inside Diameter Marking | Crankpin Diameter Marking | Bearing Insert | |
|---|---|---|---|
| | | Size Color | Part Number |
| None | ○ | Brown | 92139-0167 |
| None | None | Black | 92139-0166 |
| ○ | ○ | | |
| ○ | None | Blue | 92139-0165 |




- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

## Crankshaft and Connecting Rods

### *Crankshaft Side Clearance Inspection*




- Insert a thickness gauge [A] between the thrust washer [B] on the crankcase and the crank web [C] at the #3 main journal to determine clearance.

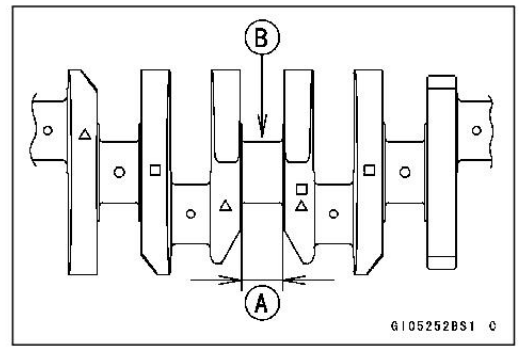
★If the clearance exceeds the service limit, replace the thrust washers as a set and check the width of the crankshaft #3 main journal.

**Crankshaft Side Clearance**
**Standard: 0.05 – 0.25 mm (0.0020 – 0.0098 in.)**
**Service Limit: 0.45 mm (0.0177 in.)**

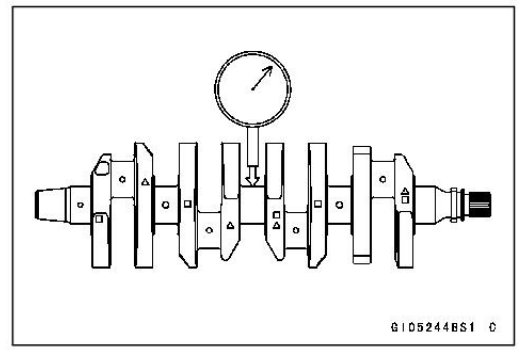
- Measure the width [A] of the crankshaft #3 main journal [B].

★If the measurement exceeds the standard, replace the crankshaft.

**Crankshaft #3 Main Journal Width**
**Standard: 21.09 – 21.14 mm (0.830 – 0.832 in.)**




### *Crankshaft Runout Inspection*

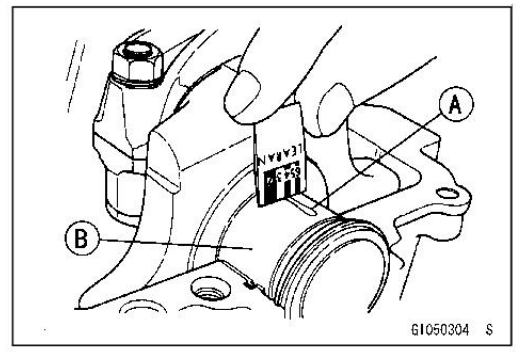



- Measure the crankshaft runout.

★If the measurement exceeds the service limit, replace the crankshaft.

**Crankshaft Runout**
**Standard: TIR 0.02 mm (0.0008 in.) or less**
**Service Limit: TIR 0.05 mm (0.0020 in.)**

### *Crankshaft Main Bearing Insert/Journal Wear Inspection*




- Split the crankcase (see Crankcase Splitting(9-11)).
- Cut strips of plastigage (press gauge) to journal width.
- Place a strip on each journal parallel to the crankshaft installed in the correct position.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly(9-12)).

**NOTE**

○*Do not turn the crankshaft during clearance measurement.*

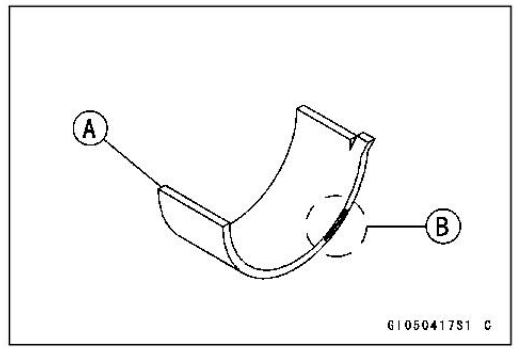
○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage [A], however, using genuine parts maintains the minimum standard clearance.*

- Split the crankcase again, measure each clearance between the bearing insert and journal [B] using plastigage (press gauge).

**Crankshaft Main Bearing Insert/Journal Clearance**
**Standard: 0.028 – 0.060 mm (0.0011 – 0.0024 in.)**
**Service Limit: 0.09 mm (0.0035 in.)**

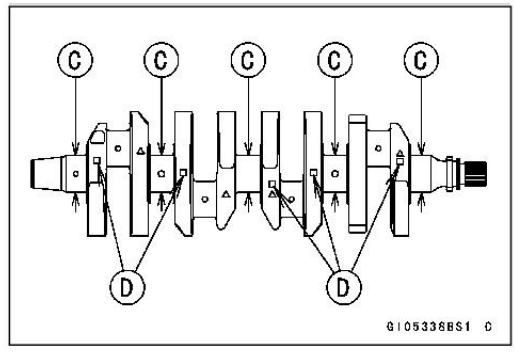
## Crankshaft and Connecting Rods

★If the clearance is within the standard, no bearing replacement is required.
★If the clearance is between 0.061 mm (0.0024 in.) and the service limit (0.09 mm, 0.0035 in.), replace the bearing inserts [A] with inserts painted blue and purple [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



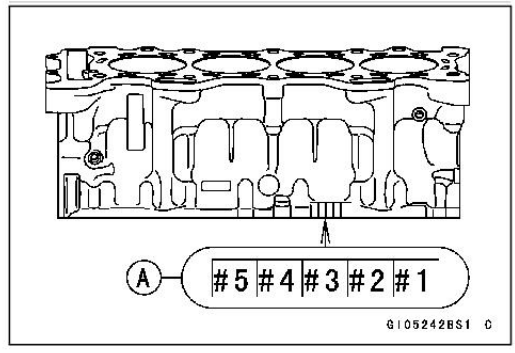

**Crankshaft Main Journal Diameter**
**Standard: 30.984 – 31.000 mm (1.2198 – 1.2205 in.)**
**Service Limit: 30.96 mm (1.2189 in.)**

★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters [C] are not less than the service limit, but do not coincide with the original diameter markings [D] on the crankshaft, make new marks on it.




**Crankshaft Main Journal Diameter Marks**
**None 30.984 – 30.992 mm (1.2198 – 1.22016 in.)**
**1 30.993 – 31.000 mm (1.22019 – 1.2205 in.)**
□: Crankshaft Main Journal Diameter Marks, “1” or no mark.

● Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
[A]: Crankcase Main Bearing Inside Diameter Marks, “○” or no mark.

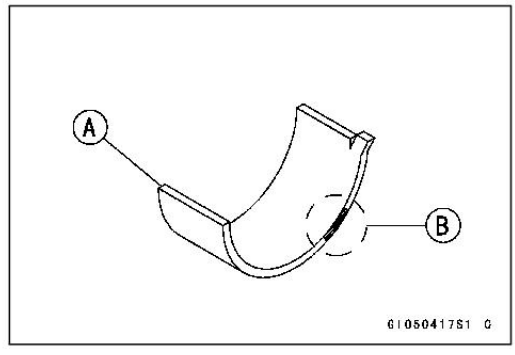



● Tighten the crankcase bolts to the specified torque (see Crankcase Assembly(9-12)).

**NOTE**
○*The mark already on the upper crankcase half should almost coincide with the measurement.*

**Crankcase Main Bearing Inside Diameter Marks**
**○ 34.000 – 34.008 mm (1.3386 – 1.33889 in.)**
**None 34.009 – 34.016 mm (1.33893 – 1.3392 in.)**

● Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
Size Color [B]



## Crankshaft and Connecting Rods

| Crankcase Main Bearing Inside Diameter Marking | Crankshaft Main Journal Diameter Marking | Bearing Insert* | | |
|---|---|---|---|---|
| | | Size Color | Part Number | Journal Nos. |
| ○ | 1 | Brown | 92139-0247 | 1, 5 |
| | | | 92139-0250 | 2, 4 |
| | | Yellow | 92139-0253 | 3 |
| None | 1 | Black | 92139-0246 | 1, 5 |
| | | | 92139-0249 | 2, 4 |
| | | Green | 92139-0252 | 3 |
| ○ | None | Black | 92139-0246 | 1, 5 |
| | | | 92139-0249 | 2, 4 |
| | | Green | 92139-0252 | 3 |
| None | None | Blue | 92139-0245 | 1, 5 |
| | | | 92139-0248 | 2, 4 |
| | | Purple | 92139-0251 | 3 |

*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

- Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

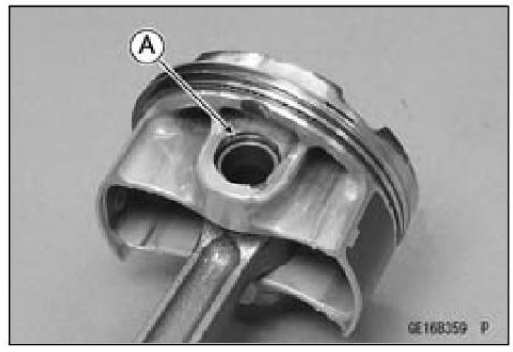
## Pistons

### *Piston Removal*

- Remove:
  Crankshaft (see Crankshaft Removal(9-17))
- Remove the piston together with the connecting rod to the cylinder head side.

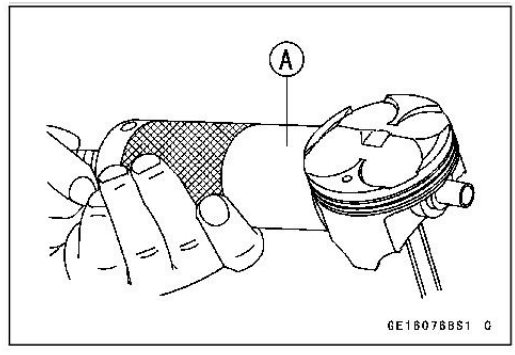
| *NOTICE* |
| --- |
| **Discard the connecting rod bolts and nuts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.** |

- Remove the piston pin snap ring [A] (Both Sides).

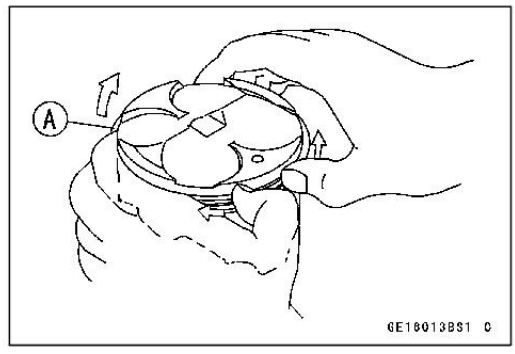



- Using the piston pin puller assembly [A], remove the piston pin.

  **Special Tool - Piston Pin Puller Assembly: 57001-910**
- Remove the piston from the connecting rod.

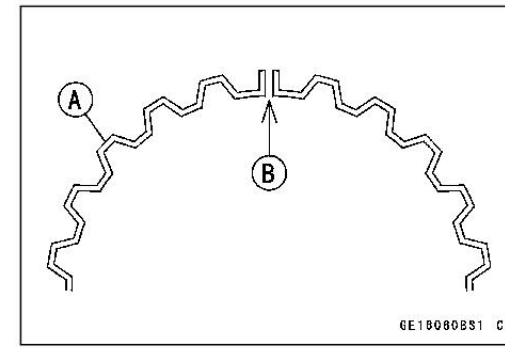



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



## Pistons

### *Piston Installation*




**NOTE**

○*If a new piston is used, use new piston ring.*

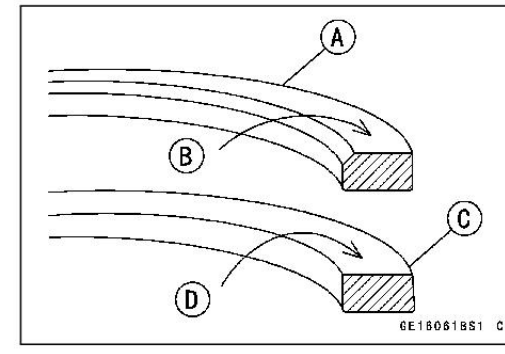
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.

**NOTE**

○*The oil ring rails have no "top" or "bottom."*

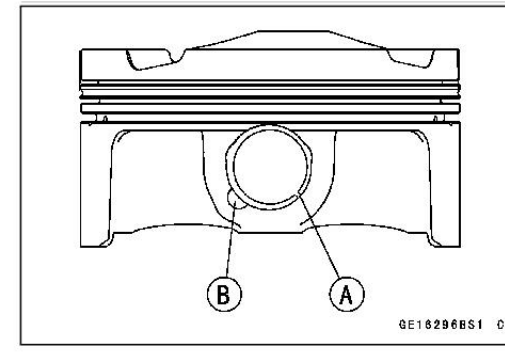



- Apply molybdenum disulfide oil solution to the piston rings.

**NOTE**

○*Do not mix up the top and second ring.*

- Install the top ring [A] so that the "R" mark [B] faces up.
- Install the second ring [C] so that the "RN" mark [D] faces up.

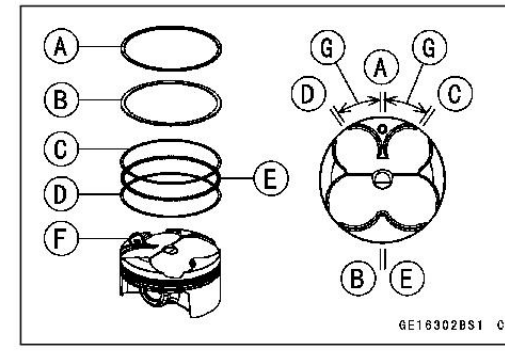



- Apply molybdenum disulfide oil solution to the piston pins and piston journals.
- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○When installing the piston pin snap ring, compress it only enough to install it and no more.

***NOTICE***

**Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.**

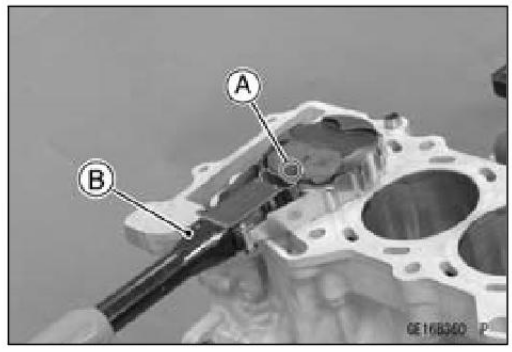



- The piston ring openings must be positioned as shown. The openings of the oil ring steel rails must be about 30 – 40° of angle from the opening of the top ring.
  Top Ring [A]
  Second Ring [B]
  Upper Oil Ring Steel Rail [C]
  Lower Oil Ring Steel Rail [D]
  Oil Ring Expander [E]
  Dent [F]
  30 – 40° [G]

## Pistons

- Apply molybdenum disulfide oil solution to the cylinder bore and piston skirt.
- Install the piston with its dent mark [A] facing exhaust side.
- Using the piston ring compressor assembly [B] to install the piston from the cylinder head side.

**Special Tools - Piston Ring Compressor Grip: 57001-1095**
**Piston Ring Compressor Belt, $\phi$67 – $\phi$79: 57001-1097**

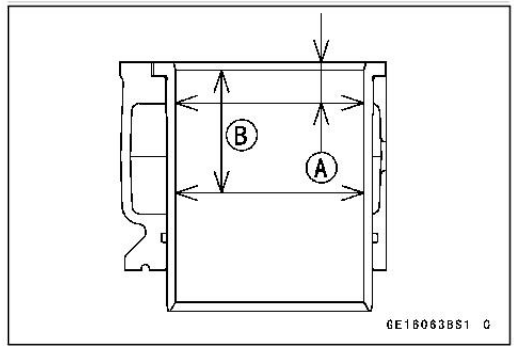



- Install:
  Crankshaft (see Crankshaft Installation(9-17))
  Connecting Rod Big End Caps (see Connecting Rod Installation(9-19))

### *Cylinder (Upper Crankcase) Wear Inspection*

- Since there is a difference in cylinder wear (upper crankcase) in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) as shown.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the crankcase.
10 mm (0.39 in.) [A]
60 mm (2.36 in.) [B]

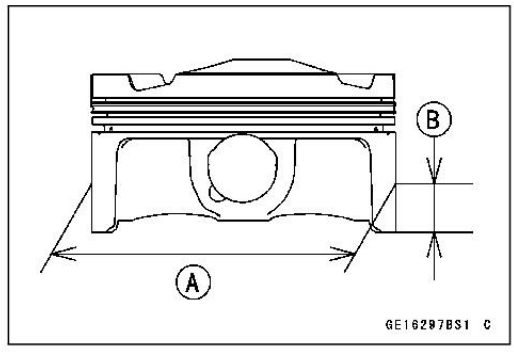



**Cylinder (Upper Crankcase) Inside Diameter**
**Standard: 67.000 – 67.012 mm (2.6378 – 2.6383 in.)**
**Service Limit: 67.09 mm (2.641 in.)**

### *Piston Wear Inspection*

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.



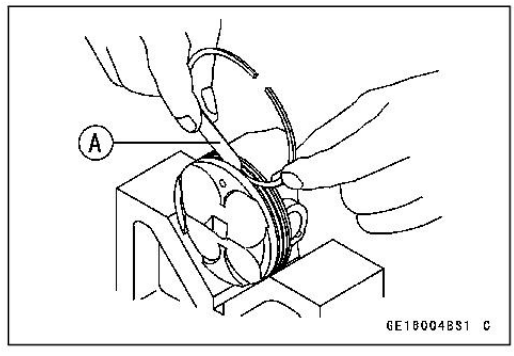

**Piston Diameter**
**Standard: 66.960 – 66.975 mm (2.6362 – 2.6368 in.)**
**Service Limit: 66.81 mm (2.630 in.)**

### *Piston Ring, Piston Ring Groove Wear Inspection*

- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

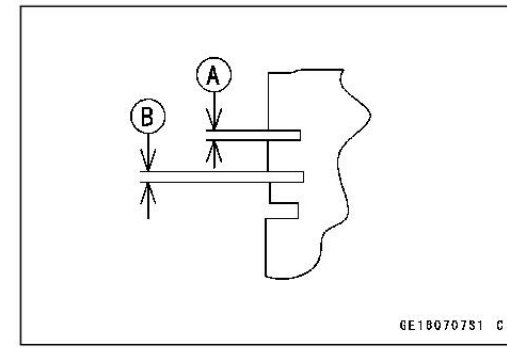
- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.




**Piston Ring/Groove Clearance**
**Standard:**
**Top 0.030 – 0.070 mm (0.00118 – 0.00276 in.)**
**Second 0.030 – 0.070 mm (0.00118 – 0.00276 in.)**
**Service Limit:**
**Top 0.17 mm (0.0067 in.)**
**Second 0.17 mm (0.0067 in.)**

## Pistons

### *Piston Ring Groove Width Inspection*

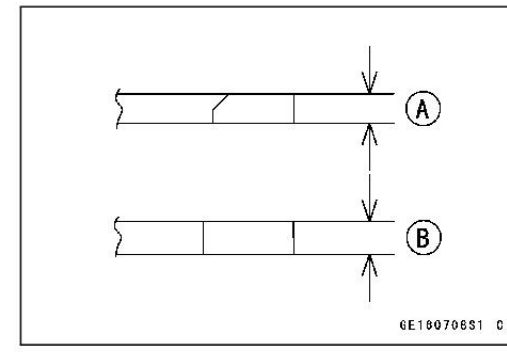



● Measure the piston ring groove width.
○Use a vernier caliper at several points around the piston.

**Piston Ring Groove Width**
**Standard:**
**Top [A] 0.82 – 0.84 mm (0.0323 – 0.0331 in.)**
**Second [B] 0.82 – 0.84 mm (0.0323 – 0.0331 in.)**
**Service Limit:**
**Top 0.92 mm (0.0362 in.)**
**Second 0.92 mm (0.0362 in.)**

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

### *Piston Ring Thickness Inspection*




● Measure the piston ring thickness.
○Use the micrometer to measure at several points around the ring.

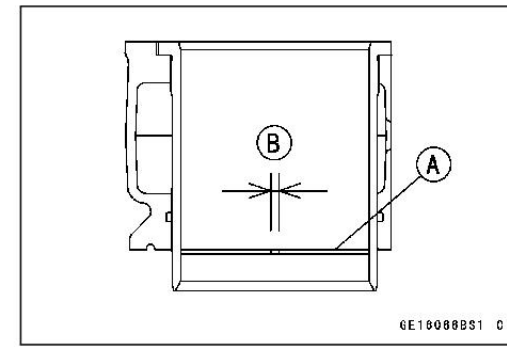
**Piston Ring Thickness**
**Standard:**
**Top [A] 0.77 – 0.79 mm (0.030 – 0.031 in.)**
**Second [B] 0.77 – 0.79 mm (0.030 – 0.031 in.)**
**Service Limit:**
**Top 0.70 mm (0.028 in.)**
**Second 0.70 mm (0.028 in.)**

★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

**NOTE**

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

### *Piston Ring End Gap Inspection*




● Place the piston ring [A] inside the cylinder (upper crankcase), using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
● Measure the gap [B] between the ends of the ring with a thickness gauge.

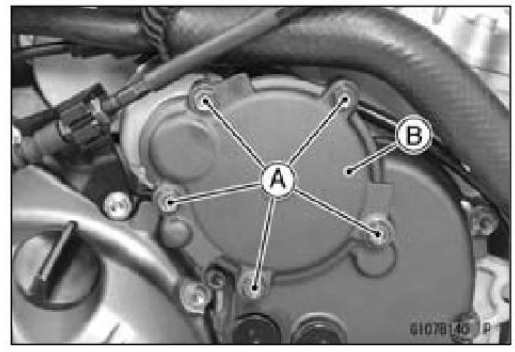
**Piston Ring End Gap**
**Standard:**
**Top 0.12 – 0.22 mm (0.0047 – 0.0087 in.)**
**Second 0.30 – 0.45 mm (0.0118 – 0.0177 in.)**
**Service Limit:**
**Top 0.5 mm (0.02 in.)**
**Second 0.8 mm (0.03 in.)**

★If the end gap of either ring is greater than the service limit, replace all the rings.

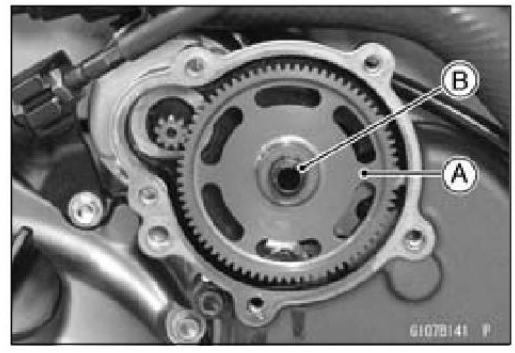
## Starter Idle Gear and Starter Motor Clutch

### *Starter Idle Gear Removal*

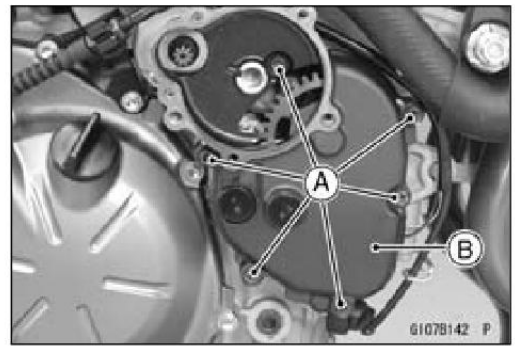
- Remove:
  Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
  Idle Gear Cover Bolts [A]
  Idle Gear Cover [B]



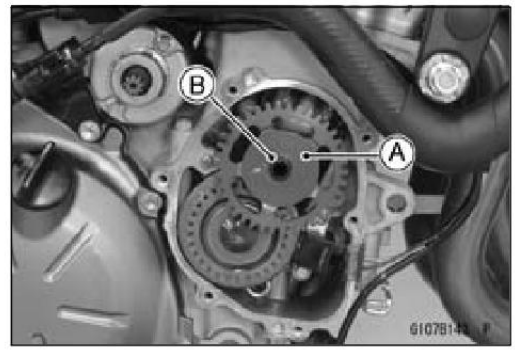

- Remove the idle gear (starter motor side) [A] with the shaft [B].




- Remove:
  Starter Motor Clutch Cover Bolts [A]
  Starter Motor Clutch Cover [B]

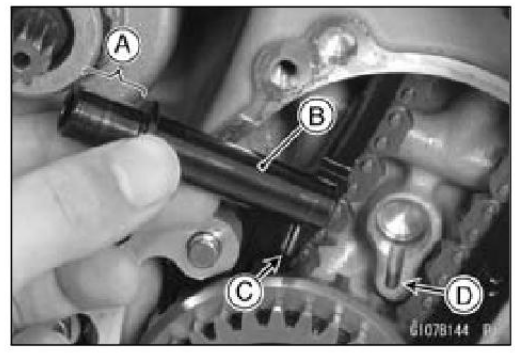



- Remove the idle gear (starter motor clutch side) [A] with the shaft [B].




### *Starter Idle Gear Installation*

- Apply molybdenum disulfide grease [A] to the idle gear shaft (starter motor clutch side) [B].
- Fit the pin [C] into the groove [D] of the crankcase.



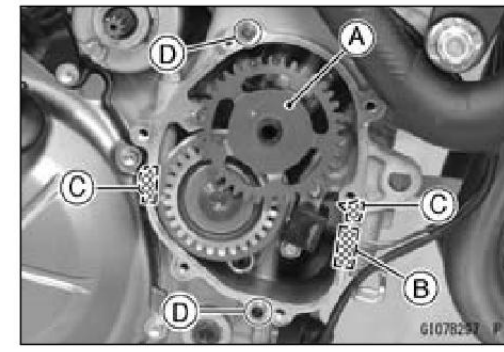
## Starter Idle Gear and Starter Motor Clutch

- Install the idle gear (starter motor clutch side) [A] on the shaft.

○Engage the idle gear with the starter motor clutch gear.

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the following portion.
  Crankshaft Sensor Lead Grommet [B]
  Crankcase Halves Mating Surfaces [C]

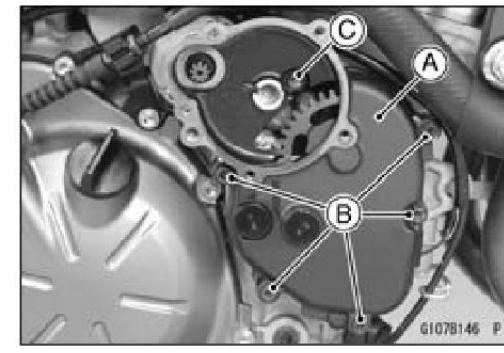
  **Sealant - Liquid Gasket, TB1211F: 92104-0004**
- Install the dowel pins [D] and new gasket.




- Apply grease to the O-ring of the starter motor.
- Install the starter motor clutch cover [A].
- Tighten:

  **Torque - Starter Motor Clutch Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

  L = 30 mm (1.18 in.) [B]
  L = 20 mm (0.79 in.) [C]

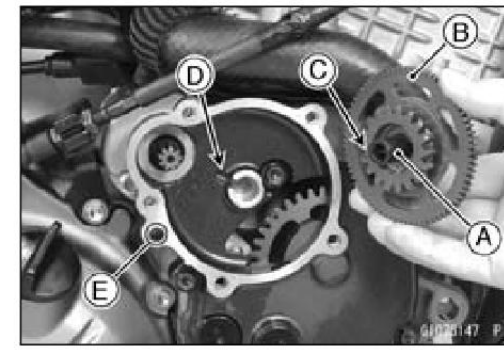



- Apply molybdenum disulfide grease to the idle gear shaft (starter motor side) [A].
- Install the idle gear (starter motor side) [B] on the shaft.

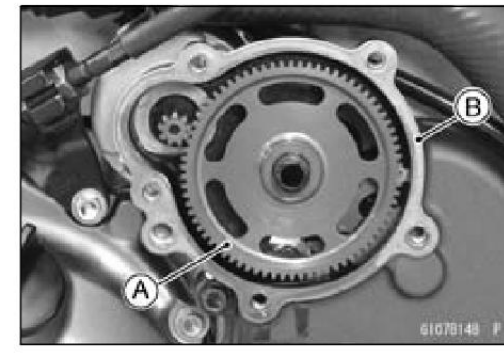
○Engage the idle gear with the starter motor gear and idle gear (starter motor clutch side).

○Fit the pin [C] into the groove [D] of the starter motor clutch cover.

- Replace the gasket with a new one.
- Install the dowel pin [E] and new gasket.




- Position the idle gear [A] to inside of the mating surface [B] of the starter motor clutch cover.

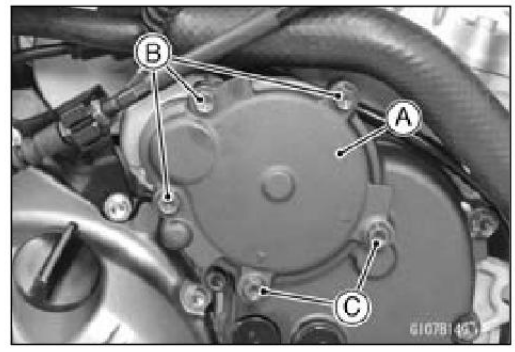


## Starter Idle Gear and Starter Motor Clutch

- Replace the gaskets with new ones.
- Install:
  Idle Gear Cover [A]
  Idle Gear Cover Bolts [B]
  Idle Gear Cover Bolts [C] with Gaskets
- Tighten:

**Torque - Idle Gear Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

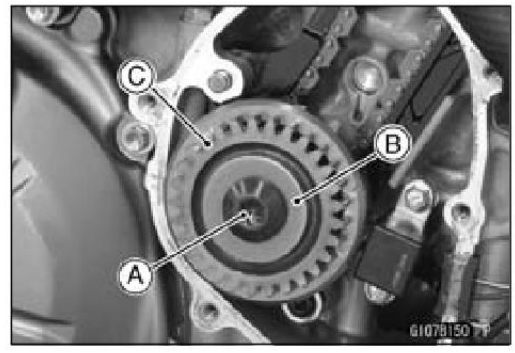
- Install the removed parts.




### *Starter Motor Clutch Removal*

- Remove:
  Alternator Cover (see Alternator Cover Removal(16-31))
  Starter Motor Clutch Cover (see Starter Idle Gear Removal(9-32))
  Idle Gear (Starter Motor Clutch Side) (see Starter Idle Gear Removal(9-32))
- Remove the starter motor clutch bolt [A], while holding the alternator rotor steady with the rotor holder (see Alternator Rotor Removal(16-33)).

**Special Tools - Grip: 57001-1591**
**Rotor Holder: 57001-1666**
**Stopper: 57001-1679**
**Rotor Holder Attachment: 57001-1689**




- Remove:
  Washer [B]
  Starter Motor Clutch [C]

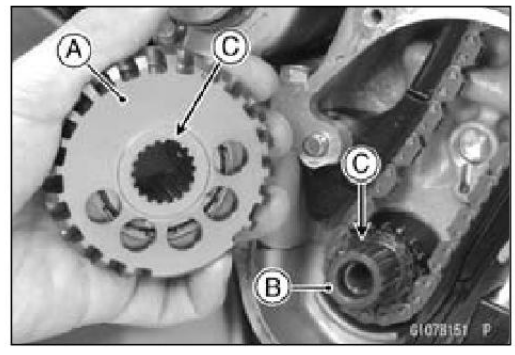
### *Starter Motor Clutch Installation*

- Install the starter motor clutch [A] on the crankshaft [B] with their teeth [C] aligned.
- Install the washer.
- Tighten the starter motor clutch bolt, while holding the alternator rotor steady with the rotor holder (see Alternator Rotor Installation(16-33)).

**Special Tools - Grip: 57001-1591**
**Rotor Holder: 57001-1666**
**Stopper: 57001-1679**
**Rotor Holder Attachment: 57001-1689**

**Torque - Starter Motor Clutch Bolt: 49 N·m (5.0 kgf·m, 36 ft·lb)**

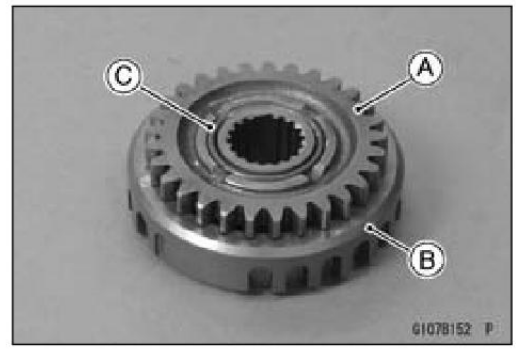
- Install the removed parts.



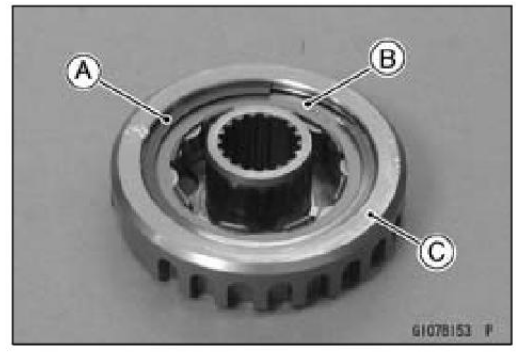
## Starter Idle Gear and Starter Motor Clutch

### *Starter Motor Clutch Disassembly*

- Remove the starter motor clutch (see Starter Motor Clutch Removal(9-34)).
- Remove the starter motor clutch gear [A] from the starter motor clutch [B].
- Remove the needle bearing [C].

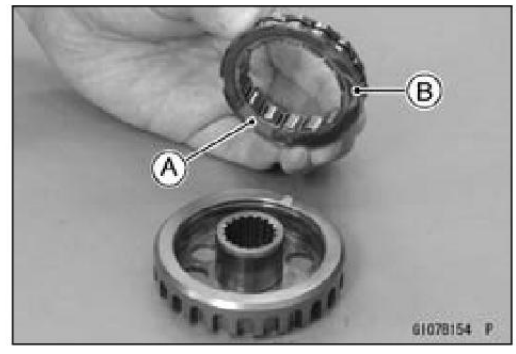



- Remove the snap ring [A].
- Remove the one-way clutch [B] from the starter motor clutch case [C].

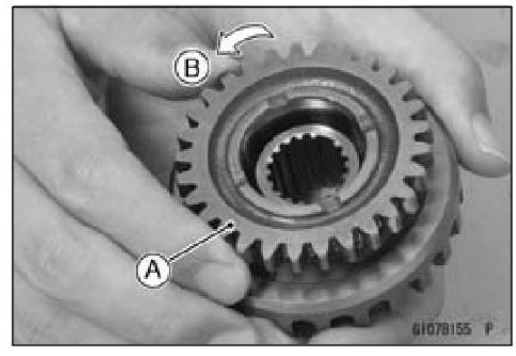



### *Starter Motor Clutch Assembly*

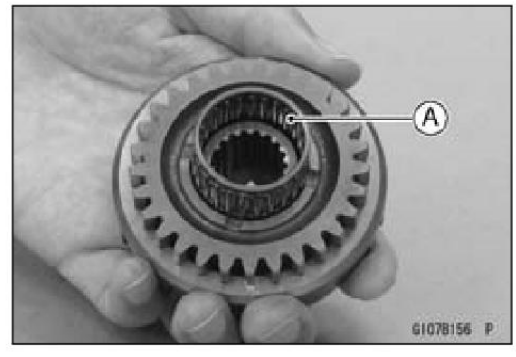
- Install the one-way clutch [A] so that its circlip side [B] faces inward.
- Replace the snap ring with a new one.
- Install the new snap ring.




- Push the starter motor clutch gear [A] in and turn it counterclockwise [B] and install it.

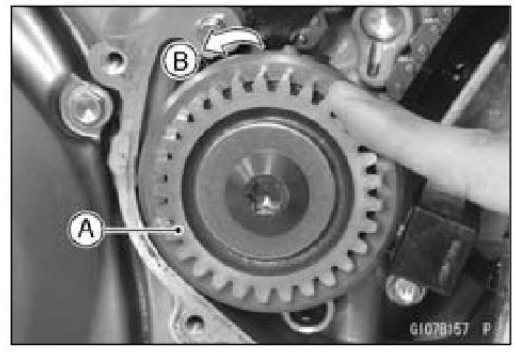



- Apply molybdenum disulfide oil solution to the needle bearing [A], and install it.



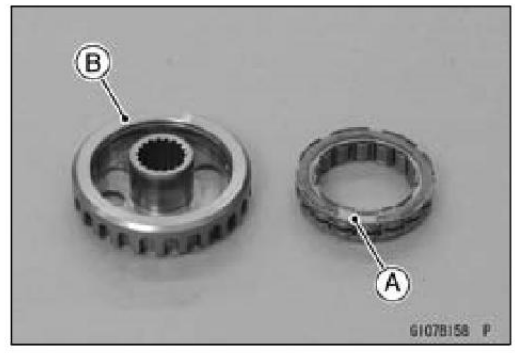
## Starter Idle Gear and Starter Motor Clutch

### *Starter Motor Clutch Inspection*



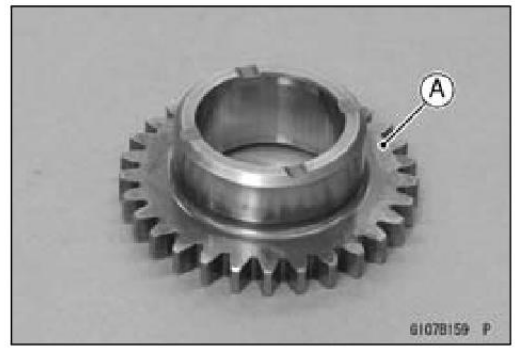

- Remove:
  Starter Motor Clutch Cover (see Starter Idle Gear Removal(9-32))
  Idle Gear (Starter Motor Clutch Side) (see Starter Idle Gear Removal(9-32))
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn counterclockwise freely [B], but should not turn clockwise.

★If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.




- Disassemble the starter motor clutch, and visually inspect the clutch parts.
  One-way Clutch [A]
  Starter Motor Clutch Case [B]

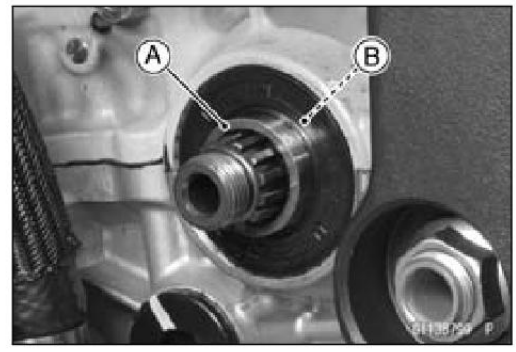
★If there is any worn or damaged part, replace it.



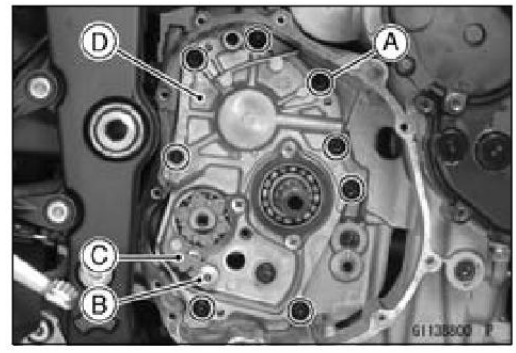

○Examine the starter motor clutch gear [A] as well. Replace the clutch gear if it is worn or damaged.

## Transmission

### *Transmission Assy Removal*




- Remove:
  Engine Sprocket (see Engine Sprocket Removal(11-12))
  Gear Position Switch (see Gear Position Switch Removal(17-80))
  Collar [A]
  O-ring [B]

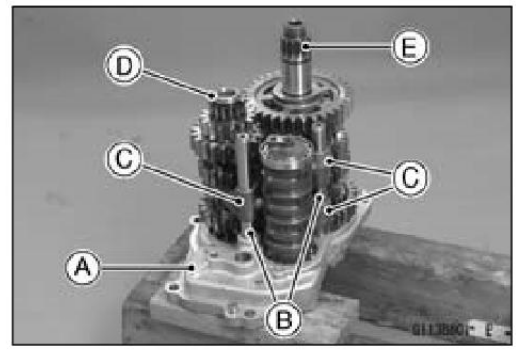



- Remove:
  Clutch (see Clutch Removal(6-13))
  Shift Shaft Assembly (see External Shift Mechanism Removal(9-47))
  Transmission Case Bolts [A]

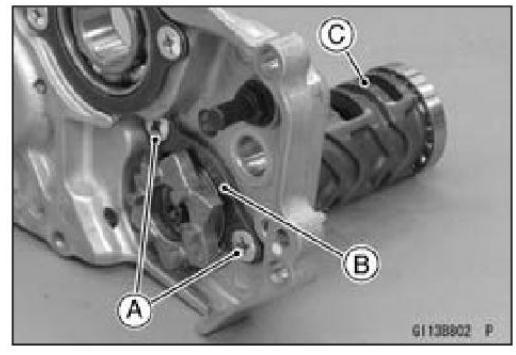
★If the transmission assy is to be disassembled, remove the following.
  Gear Positioning Lever Bolt [B]
  Gear Positioning Lever [C], Spring and Collar

- Remove the transmission assy [D] from the crankcase.

### *Transmission Assy Disassembly*

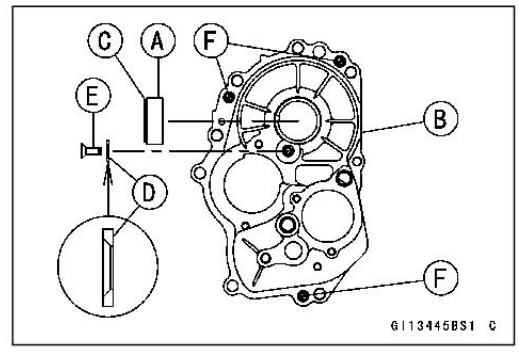



- Remove the transmission assy (see Transmission Assy Removal(9-37)).
- Remove the following from the transmission case [A].
  Shift Rods [B]
  Shift Forks [C]
  Drive Shaft [D]
  Output Shaft [E]




- Remove:
  Bearing Holder Screws [A]
  Bearing Holder [B]
  Shift Drum Assembly [C]

### *Transmission Assy Assembly*




- Press the race [A] in the transmission case [B] so that the big stepped side [C] faces to transmission gears side until it is bottomed.

  **Special Tool - Bearing Driver Set: 57001-1129**

- Install the race holder [D] as shown.
- Replace the race holder screw [E] with a new one.
- Tighten:

  **Torque - Race Holder Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

- Install the dowel pins [F] in the transmission case until they are bottomed.

## Transmission

- Press the ball bearing [A] in the transmission case [B] so that the stepped side faces outside until it is bottomed.

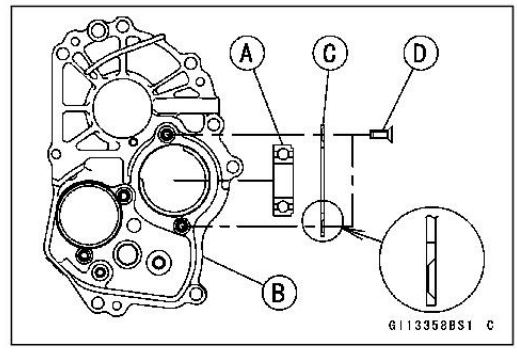
  **Special Tool - Bearing Driver Set: 57001-1129**

- Install the bearing holder [C] as shown.
- Replace the bearing holder screws [D] with new ones.
- Tighten:

  **Torque - Bearing Holder Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)**

- Replace the shift shaft return spring pin with a new one.
- Tighten:

  **Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)**

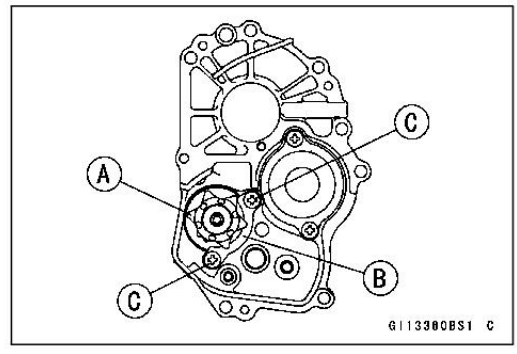



- Install:
  Shift Drum Assembly [A]
  Bearing Holder [B]

○Install the bearing holder so that the taper side faces outside.

- Replace the bearing holder screws [C] with new ones.
- Tighten:

  **Torque - Bearing Holder Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)**



## Transmission

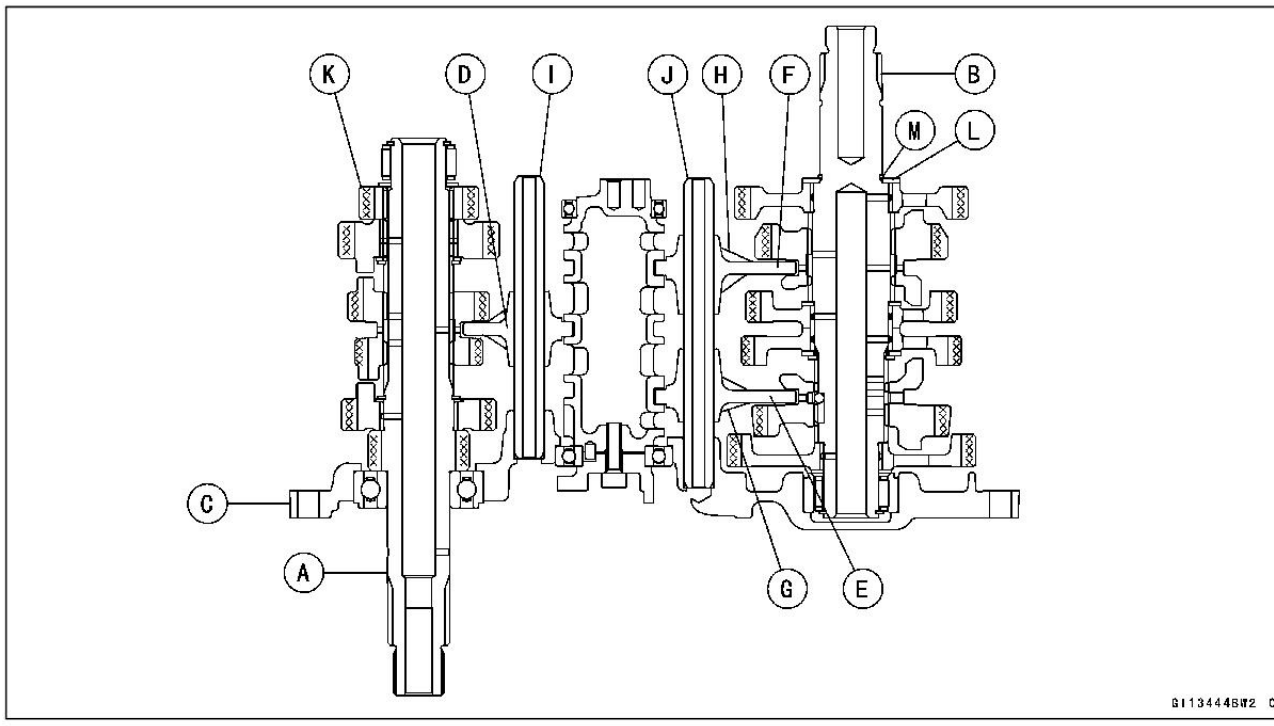
- Install the drive shaft [A] and output shaft [B] as a set in the transmission case [C].
- Install the shift forks as shown.

○The shift fork [D] for drive shaft gears has the short ears.
○The shift forks [E] [F] for output shaft gears have the long ears.
○The shift fork [E] has R mark [G].
○The shift fork [F] has L mark [H].

- Install the shift rods so that the ends of the rods are same height.

○The shift rod [I] of the drive shaft side is shorter than the shift rod [J] of the output shaft side.

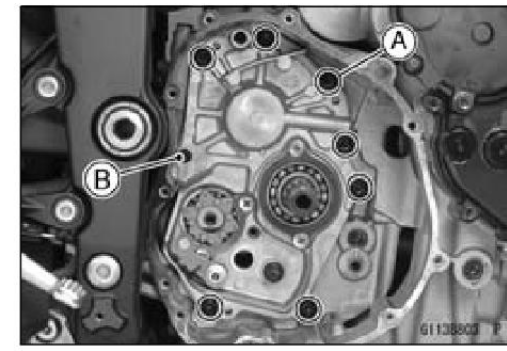
- Apply molybdenum disulfide oil solution to the transmission gears (x marks) [K].
- Install the spacer [L] on the output shaft.
- Apply grease to the O-ring [M] and install it to its position on the output shaft.




### *Transmission Assy Installation*

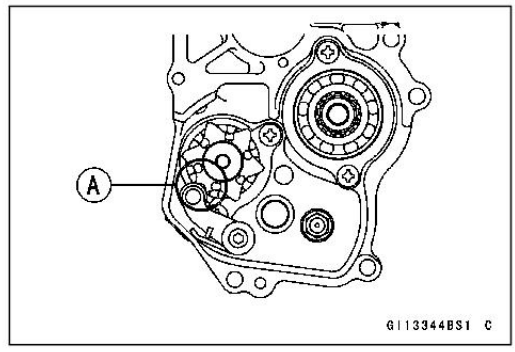
- Be sure that the dowel pins are in position.
- Install the transmission assy on the crankcase.
- Tighten:

**Torque - Transmission Case Bolts (M8) [A]: 20 N·m (2.0 kgf·m, 15 ft·lb)**
**Transmission Case Bolts (M6) [B]: 10 N·m (1.0 kgf·m, 89 in·lb)**



## Transmission

- Install the gear positioning lever (see External Shift Mechanism Installation(9-48)).
- Set the gear positioning lever to the neutral position [A].
- Check that the drive and output shaft turn freely.



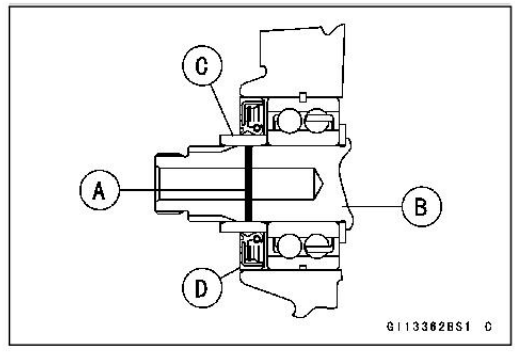

- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring and install it to its position on the output shaft [B].
- Install the collar [C].
- When installing the oil seal [D], install it as follows.

○Apply grease to the oil seal lips.

○Apply soap and water solution to the outer circumference of the oil seal so that it will go into place smoothly.

○Press the oil seal to the crankcase so that the surface of the oil seal is flush with the surface of the crankcase as shown.

- Install the removed parts.




### *Transmission Shaft Removal*

- Refer to the Transmission Assy Disassembly (see Transmission Assy Disassembly(9-37)).

### *Transmission Shaft Installation*

- Refer to the Transmission Assy Assembly (see Transmission Assy Assembly(9-37)).

### *Transmission Shaft Disassembly*

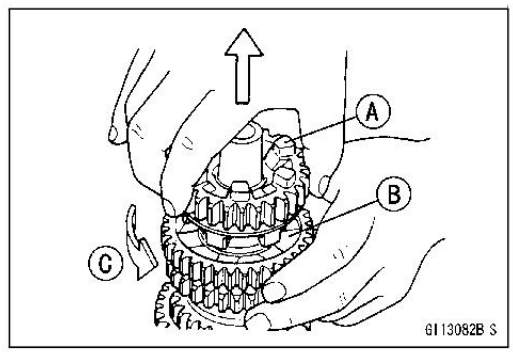
- Remove the transmission shafts (see Transmission Shaft Removal(9-40)).
- Remove the circlips, and then disassemble the transmission shafts.

**Special Tool - Outside Circlip Pliers: 57001-144**

- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].

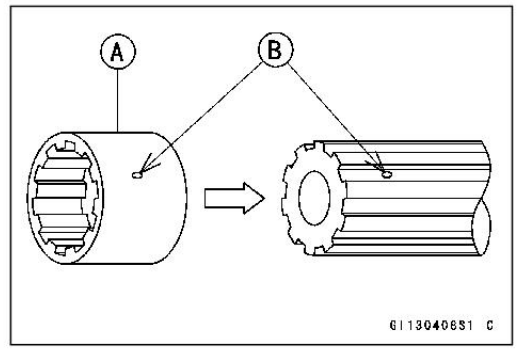
○Spin the 5th gear quickly [C] and pull it off upward.



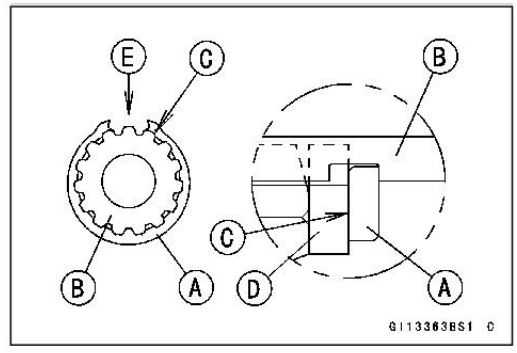
## Transmission

### *Transmission Shaft Assembly*

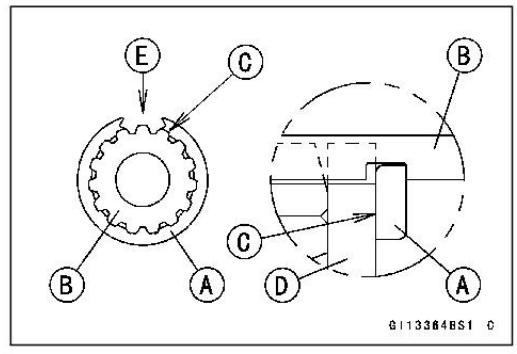
- Apply molybdenum disulfide oil solution to the sliding surfaces of the gears and shafts.
- Install the gear bushings [A] on the shaft with their holes [B] aligned.




- Replace any circlips removed with new ones.
- Install the circlip [A] on the drive shaft [B] so that the punch mark [C] faces the washer [D] and position the opening [E] as shown.



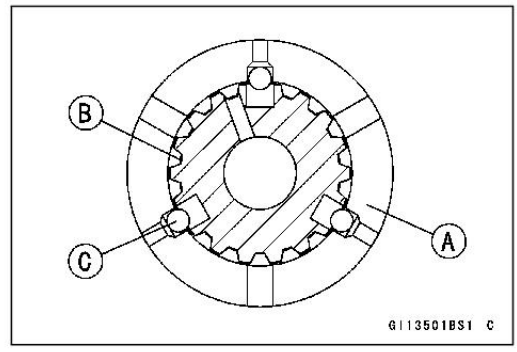

- Install the circlip [A] on the output shaft [B] so that the punch mark [C] faces the washer [D] and position the opening [E] as shown.




- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.
- Install the 5th and 6th gear bushings onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gears onto the output shaft with their oil holes aligned.
- Install the 1st, 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

## Transmission

- Fit the steel balls into the 5th gear holes in the output shaft.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]

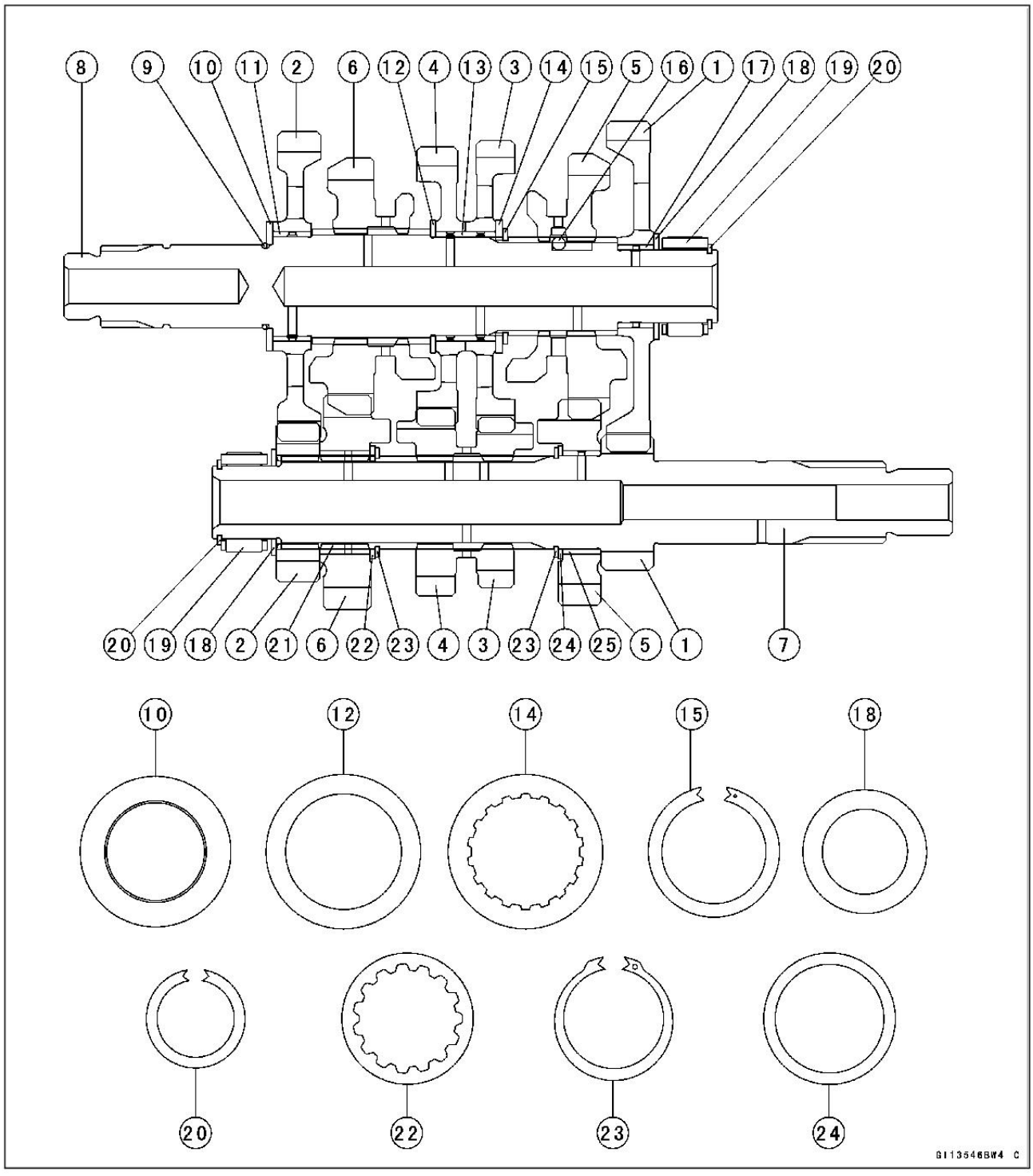



| *NOTICE* |
| --- |
| **Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.** |

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear does not come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

## Transmission




1. 1st Gear
2. 2nd Gear
3. 3rd Gear
4. 4th Gear
5. 5th Gear
6. 6th (Top) Gear
7. Drive Shaft
8. Output Shaft
9. O-ring
10. Spacer
11. Bushing
12. Washer, $\phi$40 mm (1.57 in.)
13. Bushing
14. Toothed Washer, $\phi$40 mm (1.57 in.)
15. Circlip
16. Steel Ball
17. Bushing
18. Washer, $\phi$32 mm (1.26 in.)
19. Needle Bearing
20. Circlip
21. Bushing
22. Toothed Washer, $\phi$34 mm (1.34 in.)
23. Circlip
24. Washer, $\phi$34 mm (1.34 in.)
25. Bushing

## Transmission

### *Shift Drum and Fork Removal*

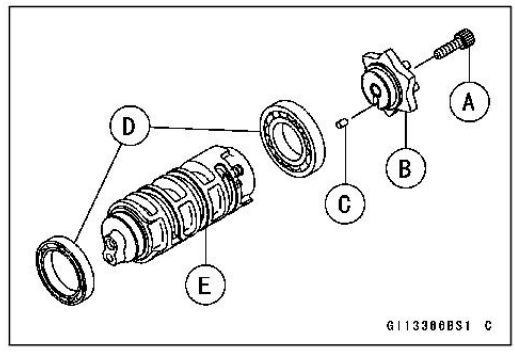
- Refer to the Transmission Assy Disassembly (see Transmission Assy Disassembly(9-37)).

### *Shift Drum and Fork Installation*

- Refer to the Transmission Assy Assembly (see Transmission Assy Assembly(9-37)).

### *Shift Drum Disassembly*

- Remove the shift drum (see Transmission Assy Disassembly(9-37)).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt [A].
- Remove:
  Shift Drum Cam [B]
  Dowel Pin [C]
  Ball Bearings [D]
  Shift Drum [E]



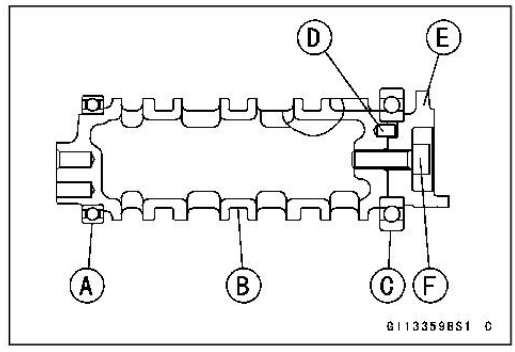

### *Shift Drum Assembly*

- Press the ball bearing [A] on the shift drum [B] until it is bottomed.
- Install:
  Ball Bearing [C]
  Dowel Pin [D] and Shift Drum Cam [E]

○Align the pin with the groove in the shift drum cam.

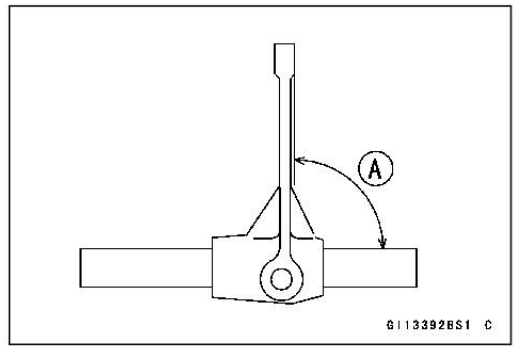
- Replace the shift drum cam holder bolt [F] with a new one, and tighten it.

**Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)**




### *Shift Fork Bending Inspection*

- Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
  90° [A]




### *Shift Fork/Gear Groove Wear Inspection*

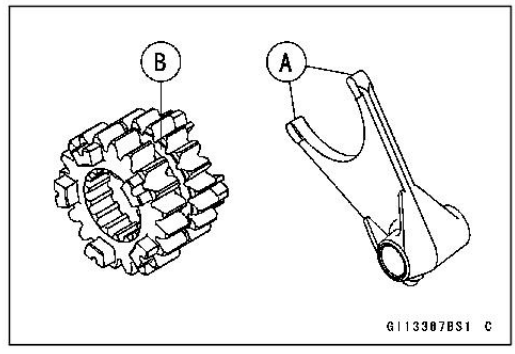
- Measure the thickness of the shift fork ears [A], and measure the width [B] of the gear grooves.

★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

**Shift Fork Ear Thickness**
**Standard: 5.9 – 6.0 mm (0.23 – 0.24 in.)**
**Service Limit: 5.8 mm (0.23 in.)**

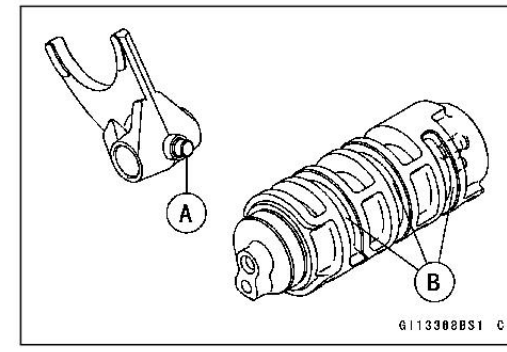
★If the gear groove is worn over the service limit, the gear must be replaced.

**Shifter Groove Width**
**Standard: 6.05 – 6.15 mm (0.238 – 0.242 in.)**
**Service Limit: 6.3 mm (0.25 in.)**



## Transmission

### *Shift Fork Guide Pin/Drum Groove Wear Inspection*




- Measure the diameter of each shift fork guide pin [A], and measure the width of each shift drum groove [B].

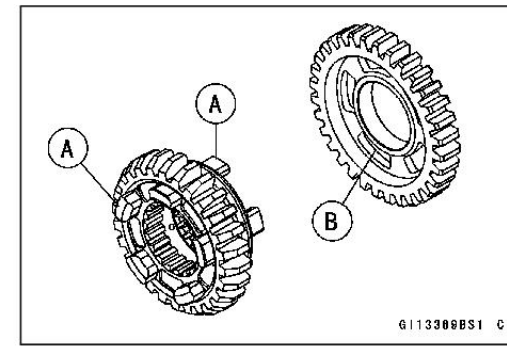
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

**Shift Fork Guide Pin Diameter**
**Standard: 5.9 – 6.0 mm (0.23 – 0.24 in.)**
**Service Limit: 5.8 mm (0.23 in.)**

★If any shift drum groove is worn over the service limit, the drum must be replaced.

**Shift Drum Groove Width**
**Standard: 6.05 – 6.20 mm (0.238 – 0.244 in.)**
**Service Limit: 6.3 mm (0.25 in.)**

### *Gear Dog and Gear Dog Hole Damage Inspection*



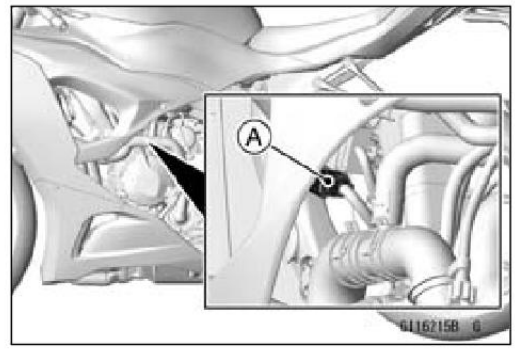

- Visually inspect the gear dogs [A] and gear dog holes [B].

★Replace any damaged gears or gears with excessively worn dogs or dog holes.

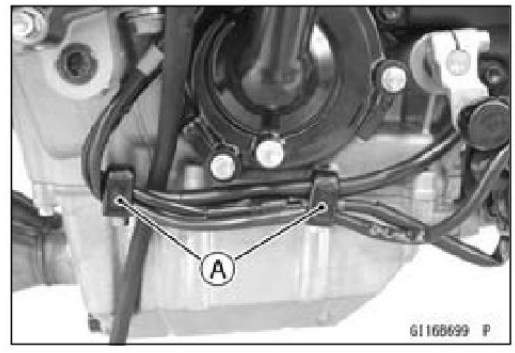
## External Shift Mechanism

### *Shift Pedal Removal*

- Remove the left lower fairing (see Lower Fairing Removal(15-9)).
- Remove the quick shifter sensor connector [A] from the bracket.
- Disconnect the quick shifter sensor connector.

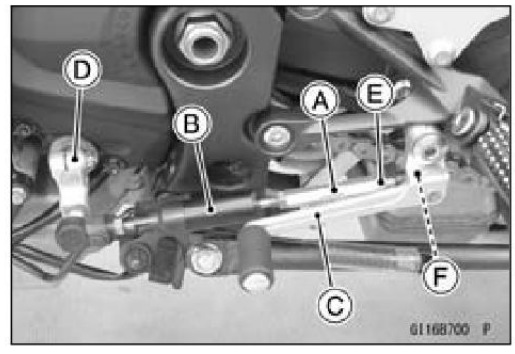



- Open the clamps [A].

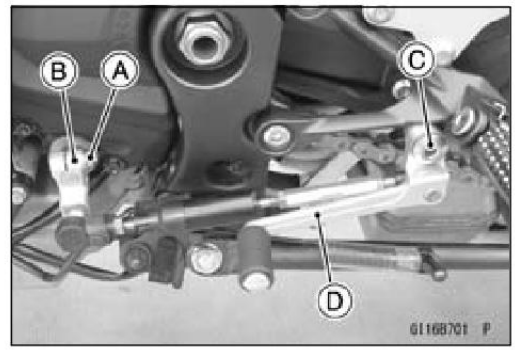



★If the tie-rod [A] and quick shifter sensor [B] is removed from the shift pedal [C] and shift lever [D], note the following.

○The following portions have left-hand threads.
Shift Pedal Side of Tie-Rod Locknut [E]
Ball Joint [F] of Shift Pedal




- Remove:
Shift Lever Bolt [A]
Shift Lever [B]
Shift Pedal Bolt [C]
Tie-Rod and Shift Pedal [D]

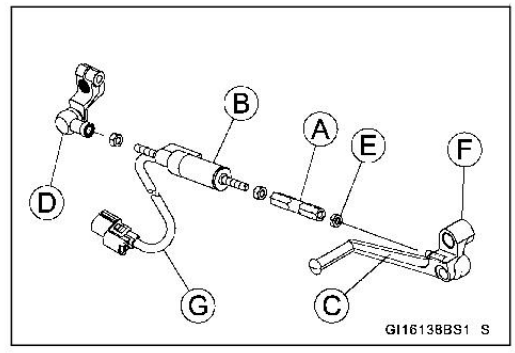



### *Shift Pedal Installation*

★When installing the tie-rod [A] and quick shifter sensor [B] to the shift pedal [C] and shift lever clamp [D], note the following.

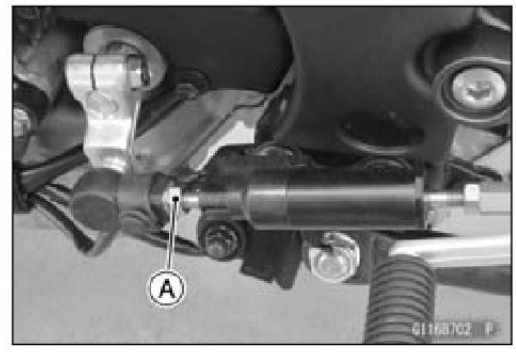
○The following portions have left-hand threads.
Shift Pedal Side of Tie-Rod Locknut [E]
Ball Joint [F] of Shift Pedal

○The quick shifter sensor lead [G] faces to the inside.



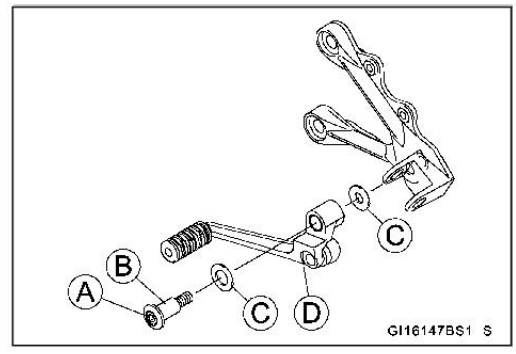
## External Shift Mechanism

● Tighten the quick shifter sensor locknut [A].

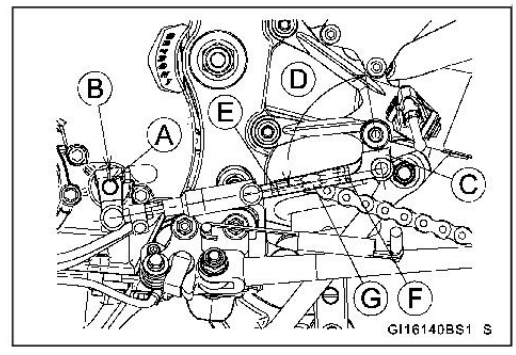



● Replace the shift pedal bolt [A] with a new one.
● Apply grease to the sliding surface [B] on the shift pedal bolt.
● Install:
Washers [C]
Shift Pedal [D]
● Tighten:

**Torque - Shift Pedal Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**



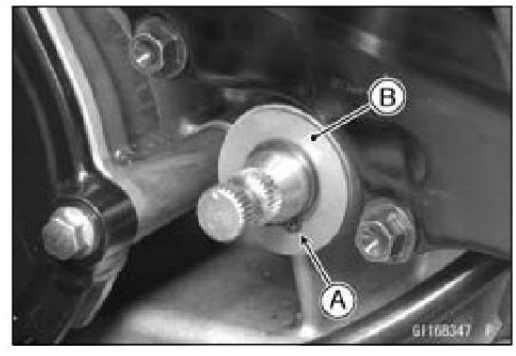

● Align the punch mark [A] on the shift shaft with the slit [B] of the shift lever.
● Tighten the shift lever bolt.
● After installation, confirm that the shift pedal [C] is positioned as shown.
About 91° [D]
★If the pedal position is different, adjust it as follows.
○To adjust the pedal position, loosen the front locknut [E] and rear locknut [F] (left-hand threads), and then turn the tie-rod [G].
○Tighten the locknuts securely.



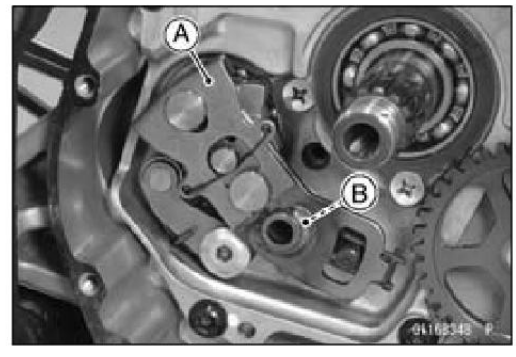

### *External Shift Mechanism Removal*

● Remove:
Shift Lever (see Shift Pedal Removal(9-46))
Clutch (see Clutch Removal(6-13))
Circlip [A]
Washer [B]

**Special Tool - Outside Circlip Pliers: 57001-144**

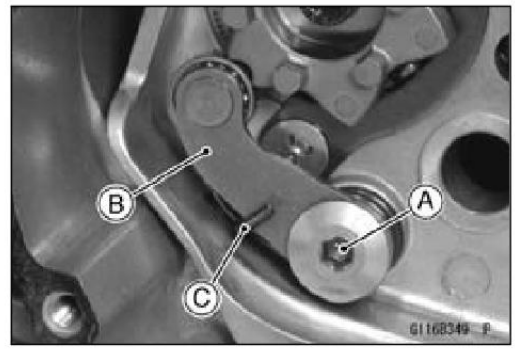



● Remove:
Shift Shaft Assembly [A]
Washer [B]



## External Shift Mechanism

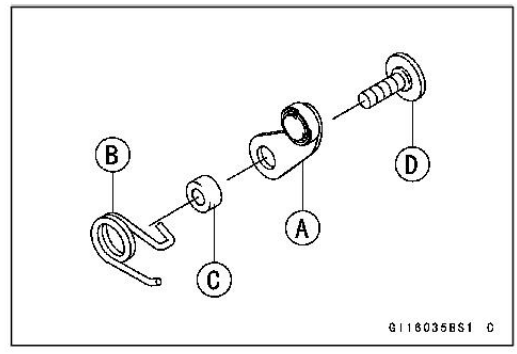
● Remove:
Gear Positioning Lever Bolt [A]
Gear Positioning Lever [B]
Collar and Spring [C]



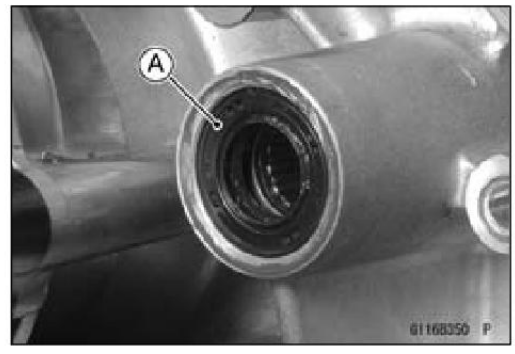

### *External Shift Mechanism Installation*

● Install the gear positioning lever [A] as shown.
● Install:
Spring [B]
Collar [C]
● Tighten:

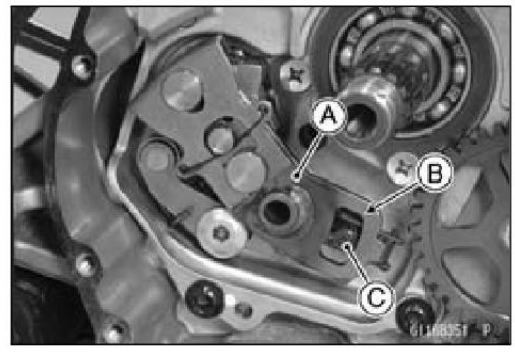
**Torque - Gear Positioning Lever Bolt [D]: 12 N·m (1.2 kgf·m, 106 in·lb)**




● Replace the oil seal [A] with a new one.
● Apply grease to the lips of the grease seal.




● Install:
Shift Shaft Assembly [A] and Washer
○Fit the hole [B] and return spring pin [C].



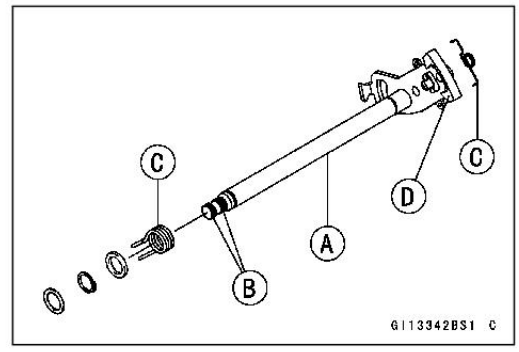

● Replace the circlip [A] with a new one.
● Install:
Circlip

**Special Tool - Outside Circlip Pliers: 57001-144**

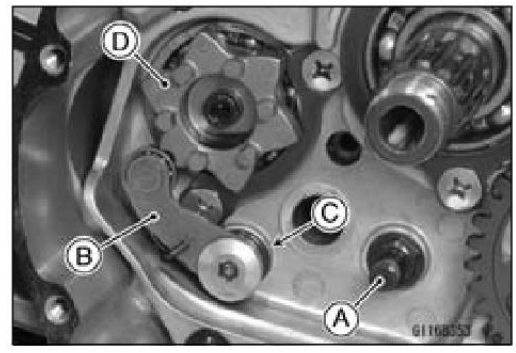
○Fit the circlip into the groove of the shift shaft securely.
● Install the removed parts.

## External Shift Mechanism

### *External Shift Mechanism Inspection*




- Examine the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the serration [B] is damaged, replace the shaft.
★If the springs [C] are damaged in any way, replace them.
★If the shift mechanism arm [D] is damaged in any way, replace the shaft.




- Check the return spring pin [A] is not loose.
★If it is loose, replace and tighten it.

**Torque - Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)**

- Check the gear positioning lever [B] and spring [C] for breaks or distortion.
★If the lever or spring are damaged in any way, replace them.
- Visually inspect the shift drum cam [D].
★If they are badly worn or if they show any damage, replace it.

## Ball Bearing, Needle Bearing, and Oil Seal

### *Ball and Needle Bearing Replacement*

| *NOTICE* |
| --- |
| **Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.** |

● Using a press or puller, remove the ball bearing and/or needle bearings.

**NOTE**

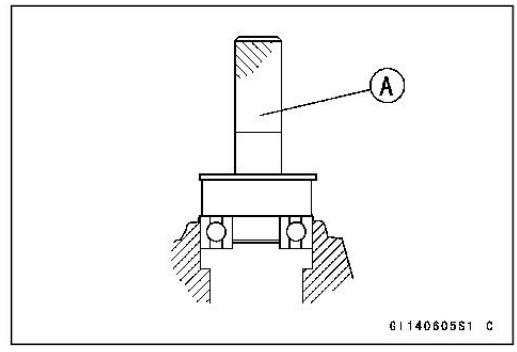
○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

| *NOTICE* |
| --- |
| **Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.** |

● Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.

○The new needle bearings must be pressed into the crankcase so that the end is flush with the end of the hole.

**Special Tool - Bearing Driver Set: 57001-1129**




### *Ball and Needle Bearing Wear Inspection*

| *NOTICE* |
| --- |
| **Do not remove the bearings for inspection. Removal may damage them.** |

● Check the ball bearings.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

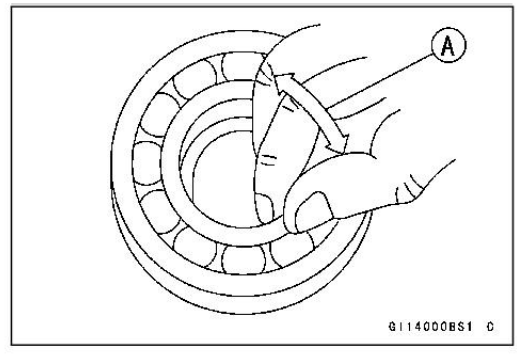
○Spin [A] the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

● Check the needle bearings.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a needle bearing, replace it.




### *Oil Seal Inspection*

● Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

# Wheels/Tires

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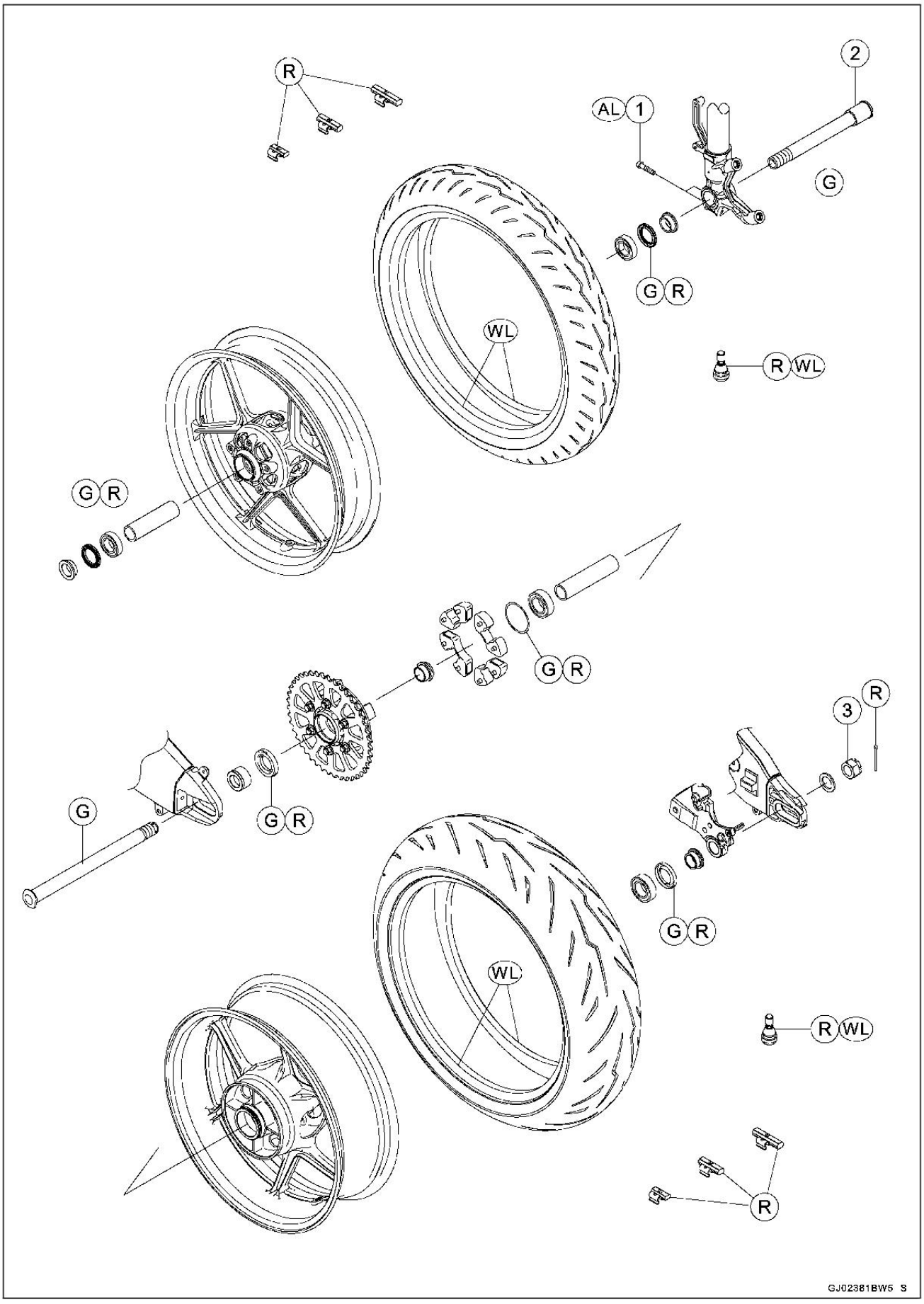
## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Front Axle Clamp Bolts | 20 | 2.0 | 15 | AL |
| 2 | Front Axle | 130 | 13.3 | 95.9 | |
| 3 | Rear Axle Nut | 130 | 13.3 | 95.9 | |

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

## Specifications

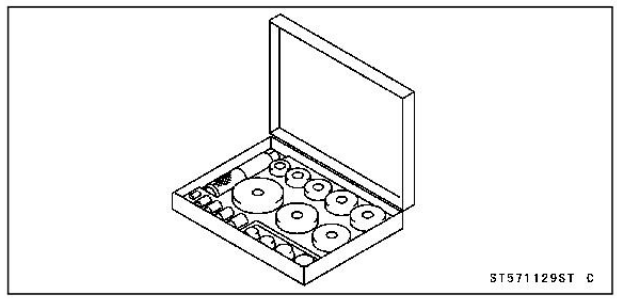
| Item | Standard | Service Limit |
|---|---|---|
| **Wheels (Rims)** | | |
| Rim Runout: | | |
| Axial | TIR 0.5 mm (0.02 in.) or less | TIR 1.0 mm (0.04 in.) |
| Radial | TIR 0.8 mm (0.03 in.) or less | TIR 1.0 mm (0.04 in.) |
| Axle Runout/100 mm (3.94 in.) | TIR 0.03 mm (0.001 in.) or less | TIR 0.2 mm (0.008 in.) |
| Wheel Balance | 10 g (0.35 oz.) or less | – – – |
| Balance Weights | 10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.) | – – – |
| Rim Size: | | |
| Front | 17M/C × MT3.50 | – – – |
| Rear | 17M/C × MT5.50 | – – – |
| **Tires** | | |
| Air Pressure (when cold): | | |
| Front | Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm$^2$, 36 psi) | – – – |
| Rear | Up to 180 kg (397 lb) load: 290 kPa (2.90 kgf/cm$^2$, 42 psi) | – – – |
| Tread Depth: | | |
| Front | 4.1 mm (0.16 in.) | 1 mm (0.04 in.) |
| Rear | 5.8 mm (0.23 in.) | Up to 130 km/h (80 mph): 2 mm (0.08 in.)<br>Over 130 kg (80 mph): 3 mm (0.12 in.) |
| Standard Tires: | | |
| Front: | | |
| Make | PIRELLI | – – – |
| Type | DIABLO ROSSO IV C | – – – |
| Size | 120/70 ZR17 M/C (58W) | – – – |
| Rear: | | |
| Make | PIRELLI | – – – |
| Type | DIABLO ROSSO IV C | – – – |
| Size | 180/55 ZR17 MC (73W) | – – – |

**⚠ WARNING**

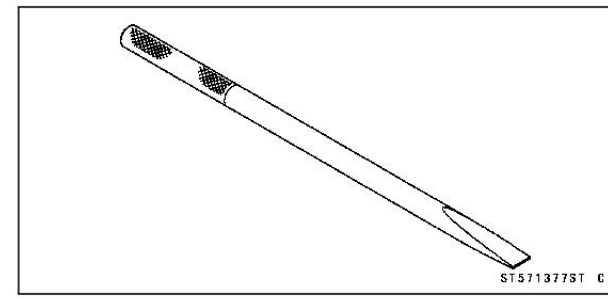
**Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.**

## Special Tools

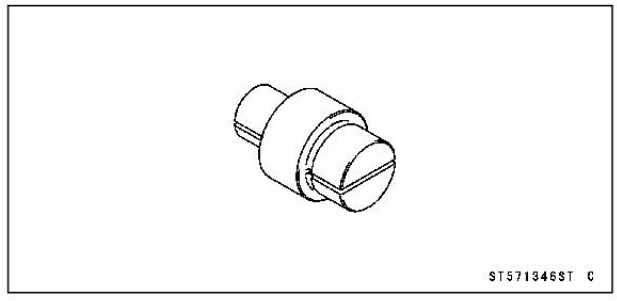
**Bearing Driver Set:**
**57001-1129**




**Bearing Remover Shaft, $\phi$13:**
**57001-1377**

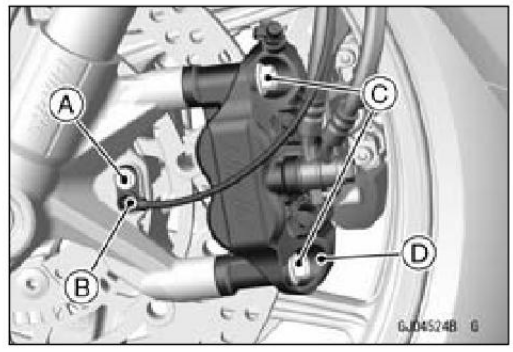



**Bearing Remover Head, $\phi$25 × $\phi$28:**
**57001-1346**

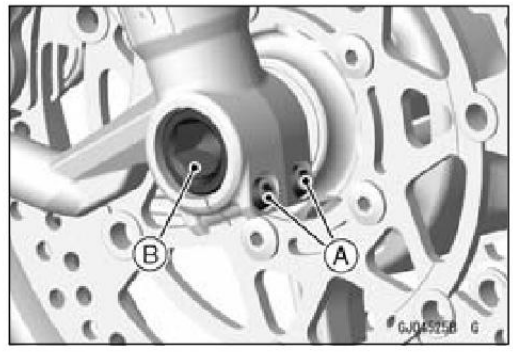


## Wheels (Rims)

### *Front Wheel Removal*




- Remove:
  Bolt [A]
  Front Wheel Rotation Sensor [B]
  Front Caliper Mounting Bolts [C] (Both Sides)
  Front Caliper [D] (Both Sides)




- Loosen:
  Front Axle Clamp Bolts [A]
  Front Axle [B]

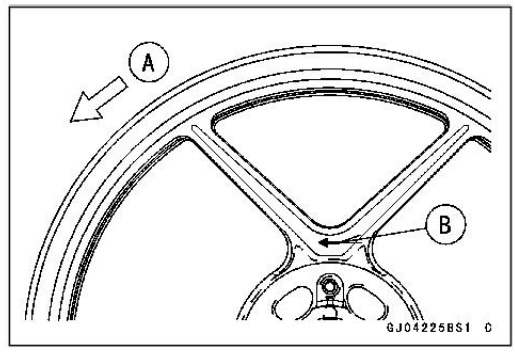
- Raise the front wheel off the ground with a suitable stand.
- Pull out the front axle and drop the front wheel out of the front forks.

| *NOTICE* |
| --- |
| **Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.** |

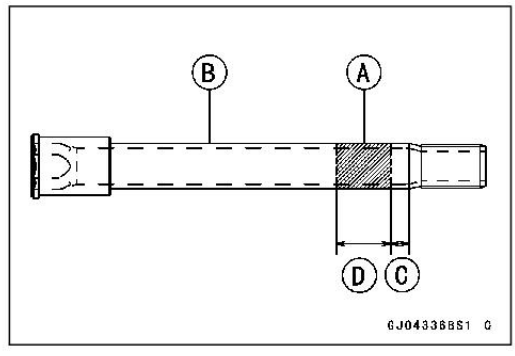
### *Front Wheel Installation*

**NOTE**

○*The direction of the wheel rotation [A] is shown by an arrow [B] on the wheel spoke.*




- Check the wheel rotation mark on the front wheel and install it.




- Apply a thin coat of grease [A] to the front axle [B] for rust prevention.
  About 10 mm (0.4 in.) [C]
  About 30 mm (1.2 in.) [D]

**NOTE**

○*Do not apply grease to the threads of the axle.*

★If the front axle nut adhere, wipe off any grease.

## Wheels (Rims)

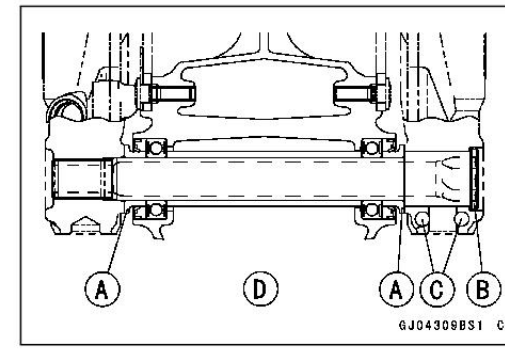
- Apply grease to the grease seal lips.
- Fit the collars [A] on the both sides of the hub.

○The collars are identical.

- Insert the front axle [B] from the right side.
- Temporarily tighten the front axle and remove the stand.
- Tighten:

**Torque - Front Axle: 130 N·m (13.3 kgf·m, 95.9 ft·lb)**

Front Axle Clamp Bolts [C]
Viewed from Rear [D]




- Before tightening the front axle clamp bolts on the right front fork leg, pump the front fork up and down 4 or 5 times to allow the right front fork leg to seat on the front axle.

**NOTE**

○*Put a block in front of the front wheel to stop moving.*

- Tighten:

**Torque - Front Axle Clamp Bolts: 20 N·m (2.0 kgf·m, 15 ft·lb)**

**NOTE**

○*Tighten the two clamp bolts alternately two times to ensure even tightening torque.*

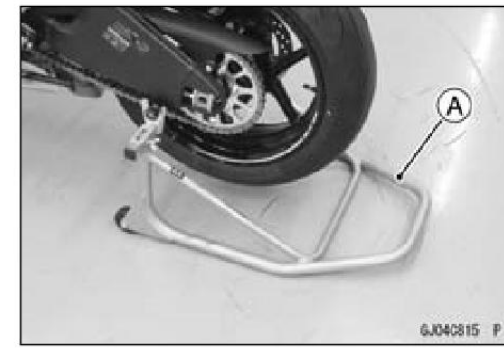
- Install the removed parts.
- Check the front brake effectiveness (see Brake System Inspection(2-43)).

**⚠ WARNING**

**After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.**

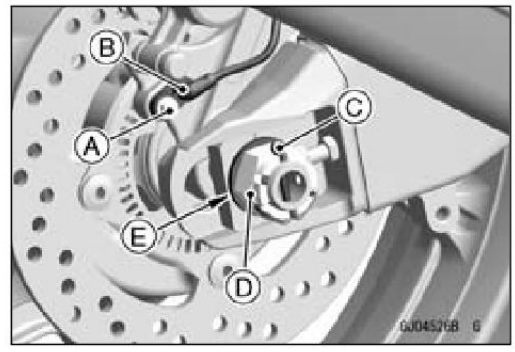
### *Rear Wheel Removal*

- Raise the rear wheel off the ground with a suitable stand [A].



## Wheels (Rims)

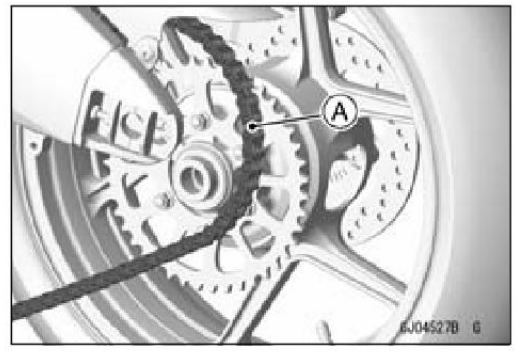
- Remove:
  Bolt [A]
  Rear Wheel Rotation Sensor [B]
  Cotter Pin [C]
  Rear Axle Nut [D]
  Washer [E]
  Rear Axle




- Disengage the drive chain [A] from the rear sprocket.
- Move the rear wheel back and remove it.

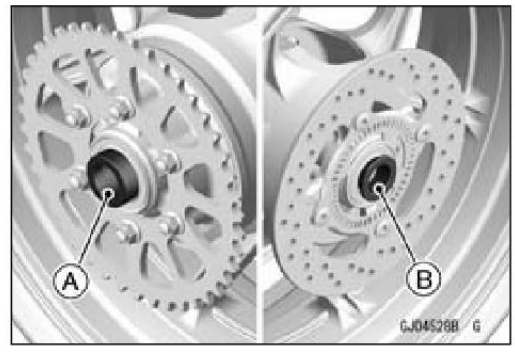
***NOTICE***

**Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.**

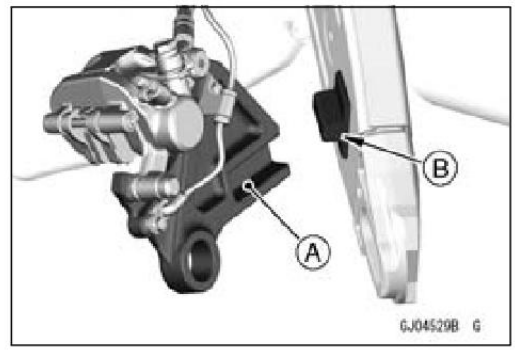



### *Rear Wheel Installation*

- Apply grease to the grease seal lips.
- Fit the collars on the both sides of the hub.
  Left Side Collar [A]
  Right Side Collar [B] (with Flange)



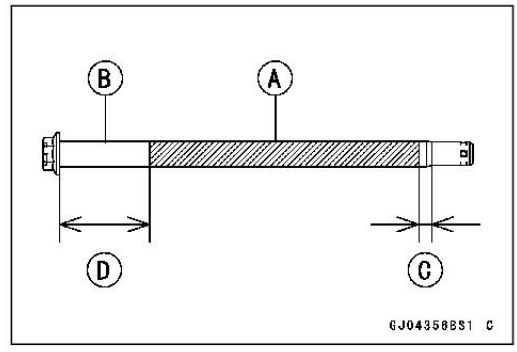

- Engage the drive chain with the rear sprocket.
- Install the caliper bracket [A] onto the stopper [B] of the swingarm.




- Apply a thin coat of grease [A] to the rear axle [B] for rust prevention.
  About 10 mm (0.4 in.) [C]
  About 70 mm (2.8 in.) [D]

**NOTE**

○*Do not apply grease to the threads of the axle.*




★If the rear axle nut adhere, wipe off any grease.
- Insert the rear axle from the left side of the wheel.
- Install the washer and rear axle nut.
- Adjust the drive chain slack before tightening the rear axle nut (see Drive Chain Slack Inspection(2-40)).
- Tighten:

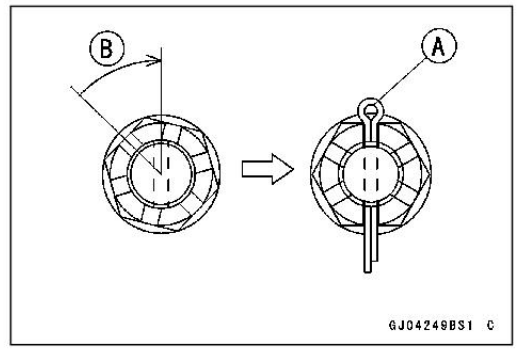
**Torque - Rear Axle Nut: 130 N·m (13.3 kgf·m, 95.9 ft·lb)**

## Wheels (Rims)

● Insert a new cotter pin [A].

**NOTE**

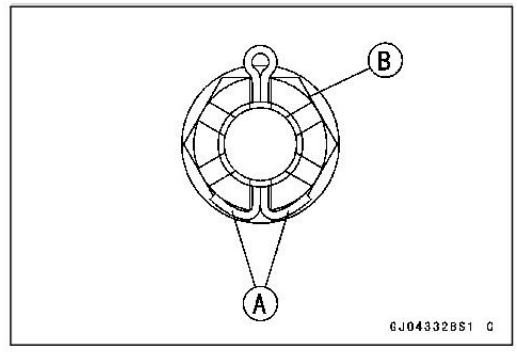
○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degrees.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*




● Bend the cotter pin [A] over the nut [B].

**⚠ WARNING**

**A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.**



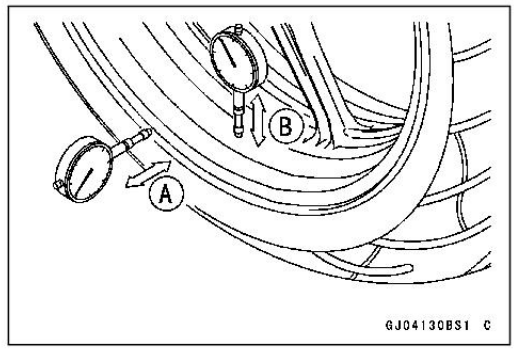

● Install the rear wheel rotation sensor (see Rear Wheel Rotation Sensor Installation(12-34)).
● Check the rear brake effectiveness (see Brake System Inspection(2-43)).

**⚠ WARNING**

**After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.**

## Wheels (Rims)

### *Wheel Inspection*




- Raise the front/rear wheel off the ground with a suitable stand.
- Spin the wheel lightly, and check for roughness or binding.

★If roughness or binding is found, replace the hub bearings.

- Inspect the wheel for small cracks, dents, bending, or warp.

★If there is any damage to the wheel, replace the wheel.

- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.

★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection(10-17)).

★If the problem is not due to the bearings, replace the wheel.

**Rim Runout (with tire installed)**

**Standard:**

| | |
|---|---|
| **Axial** | **TIR 0.5 mm (0.02 in.) or less** |
| **Radial** | **TIR 0.8 mm (0.03 in.) or less** |

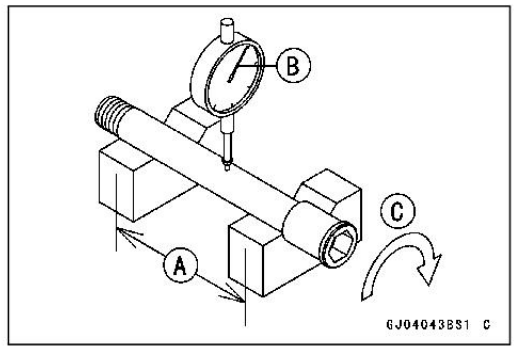
**Service Limit:**

| | |
|---|---|
| **Axial** | **TIR 1.0 mm (0.04 in.)** |
| **Radial** | **TIR 1.0 mm (0.04 in.)** |

**⚠ WARNING**

**Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.**

### *Axle Inspection*




- Remove the front and rear axles (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Visually inspect the front and rear axle for damages.

★If the axle is damaged or bent, replace it.

- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.

★If axle runout exceeds the service limit, replace the axle.

**Axle Runout/100 mm (3.94 in.)**

| | |
|---|---|
| **Standard:** | **TIR 0.03 mm (0.001 in.) or less** |
| **Service Limit:** | **TIR 0.2 mm (0.008 in.)** |

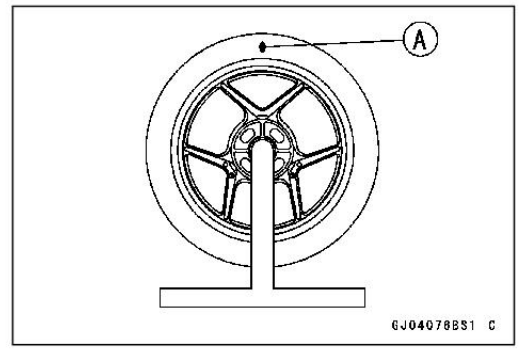
## Wheels (Rims)

### *Balance Inspection*

- Remove the front and rear wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment(10-11)).

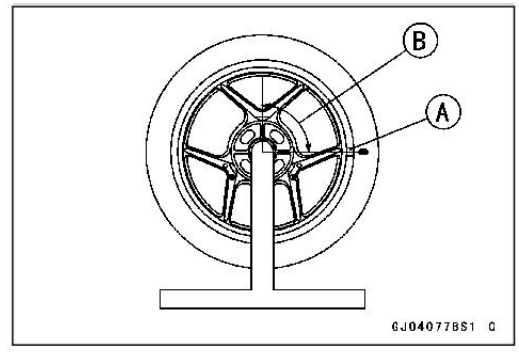



### *Balance Adjustment*

- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.

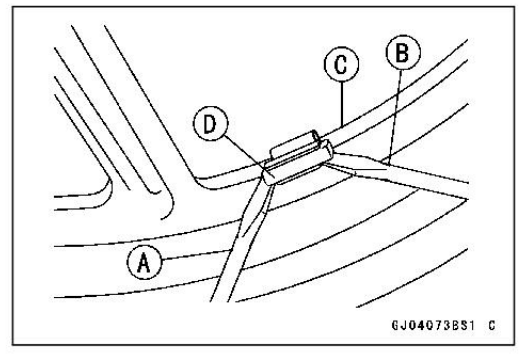



### *Balance Weight Removal*

- Insert flat tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

**NOTICE**

**Do not tap the screwdrivers. The rim could be damaged.**



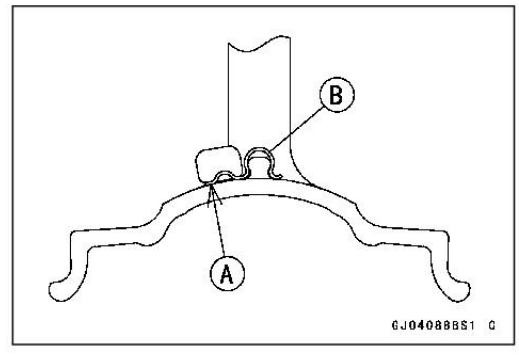

### *Balance Weight Installation*

- Check if the weight portion has any play on the blade [A] and clip [B].

★If it does, discard it.

**⚠ WARNING**

**Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.**



## Wheels (Rims)

**Balance Weight**

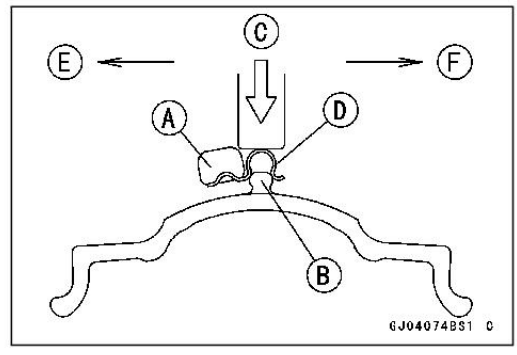
| Part Number | Weight |
|---|---|
| 41075-0007 | 10 g (0.35 oz.) |
| 41075-0008 | 20 g (0.71 oz.) |
| 41075-0009 | 30 g (1.06 oz.) |

**NOTE**

○*Balance weights are available from Kawasaki dealers in 10, 20 and 30 grams (0.35, 0.71 and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*

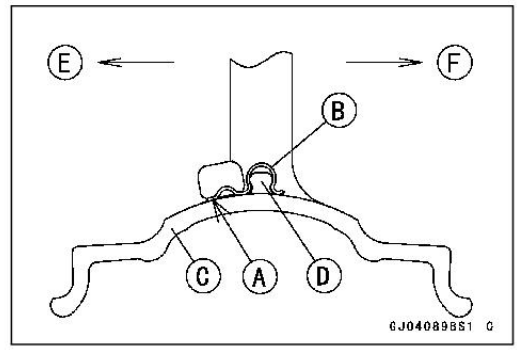
○*Do not use four or more balance weight (more than 90 gram, 3.2 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

● Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
Left Side [E]
Right Side [F]




● Be sure to install the balance weight.

○Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
Left Side [E]
Right Side [F]



## Tires

### *Air Pressure Inspection/Adjustment*

- Refer to the Air Pressure Inspection (see Air Pressure Inspection(2-38)).

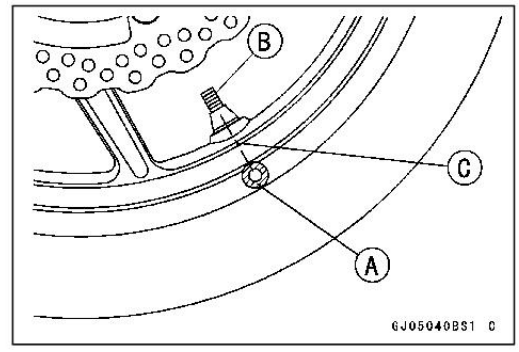
### *Tire Inspection*

- Refer to the Wheel/Tire Damage Inspection (see Wheels and Tires(2-38)).

### *Tire Removal*

- Remove:
  Wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7))
  Valve Core (Let out the air)

- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  Chalk Mark or Yellow Mark [A]
  Valve Stem [B]
  Align [C]




- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

| *NOTICE* |
| --- |
| **Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.** |

- Remove the tire from the rim using a suitable commercially available tire changer.

**NOTE**

○*The tires cannot be removed with hand tools because they fit the rims too tightly.*

### *Tire Installation*

| ⚠ WARNING |
| --- |
| **Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.** |

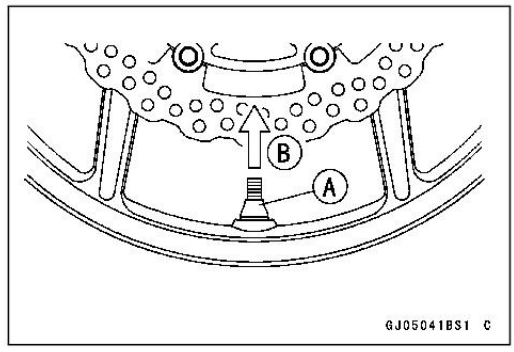
- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

| *NOTICE* |
| --- |
| **Replace the air valve whenever the tire is replaced. Do not reuse the air valve.** |

## Tires

● Install a new valve in the rim.

○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

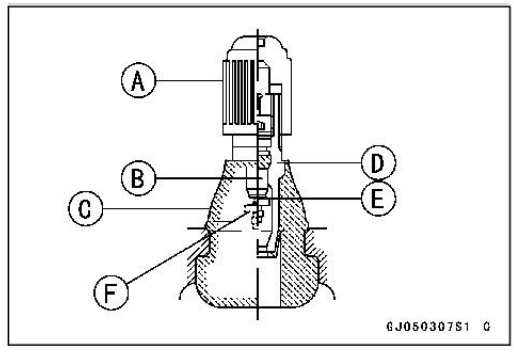



***NOTICE***

**Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.**

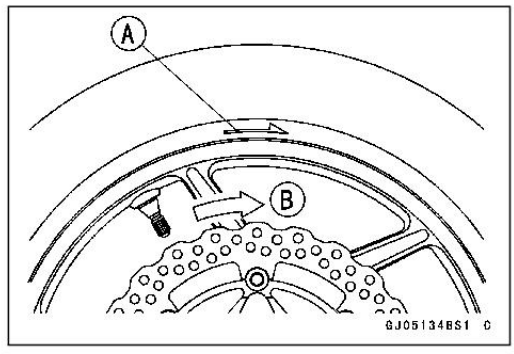
○The air valve is as shown.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]




● Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Tire Rotation Mark [A]
Rotating Direction [B]

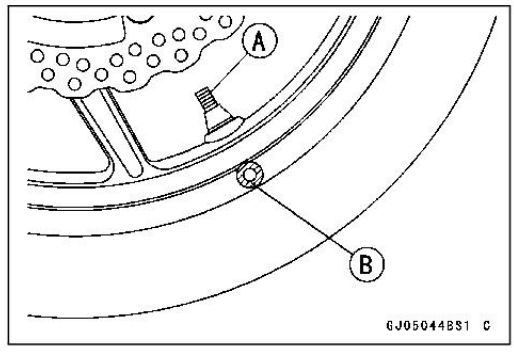



● Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).

● Install the tire bead over the rim flange using a suitable commercially available tire changer.

● Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.

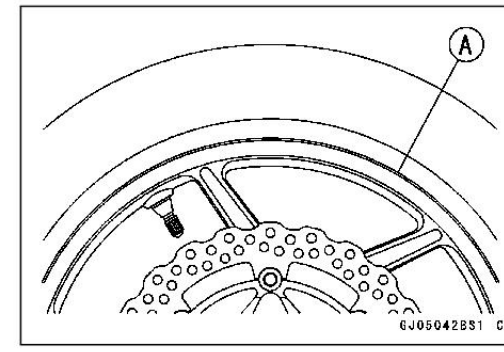
● Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.




**⚠ WARNING**

**Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).**

## Tires




- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection(2-38)).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment(10-11)).

### *Tire Repair*

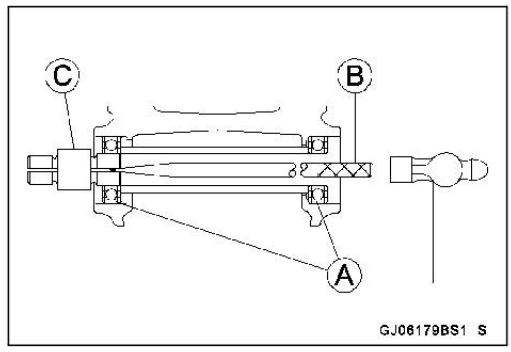
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

## Hub Bearing

### *Hub Bearing Removal*

- Remove the wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)), and take out the following.
  Collars
  Coupling (Out of rear hub)
  Grease Seals

- Use the bearing remover to remove the hub bearings [A].




| *NOTICE* |
| --- |
| **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.** |

**Special Tools - Bearing Remover Shaft, $\phi$13 [B]: 57001 -1377**
**Bearing Remover Head, $\phi$25 × $\phi$28 [C]: 57001-1346**

### *Hub Bearing Installation*

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.

**NOTE**

○*Install the bearings so that the marked side faces out.*

**Front Hub**

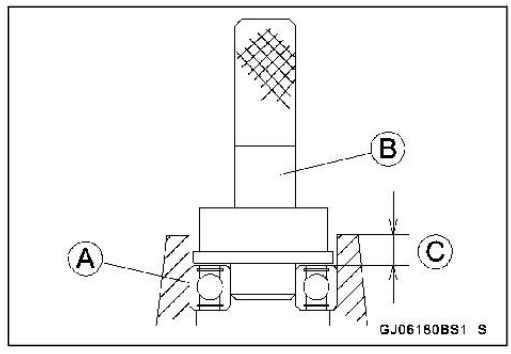
- Press in the right bearing [A] until it is bottomed.

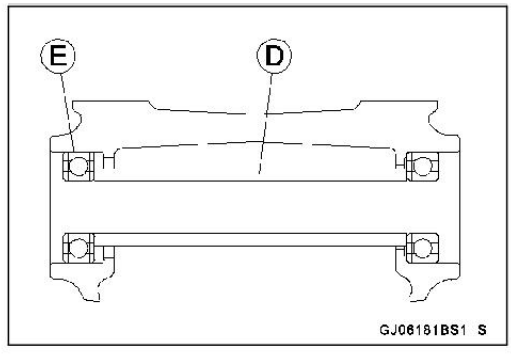
**Special Tool - Bearing Driver Set [B]: 57001-1129**

- Measure the depth [C] from bearing outer surface to wheel outer surface.
- Install the collar [D].
- Press in the left bearing [E] until it is bottomed on the collar.

**Special Tool - Bearing Driver Set: 57001-1129**

- Remeasure the depth from bearing outer surface to wheel outer surface and ensure that it is not changed before/after pressing bearings.



## Hub Bearing

### Rear Hub

**NOTE**

○*The installation of the rear hub bearing is basically the same as the procedure for the front hub bearing.*

- Press in the right bearing until it is bottomed.

**Special Tool - Bearing Driver Set: 57001-1129**

- Measure the depth from bearing outer surface to wheel outer surface.
- Install the collar.
- Press in the left bearing until it is bottomed on the collar.

**Special Tool - Bearing Driver Set: 57001-1129**

- Remeasure the depth from bearing outer surface to wheel outer surface and ensure that it is not changed before/after pressing bearings.

- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.

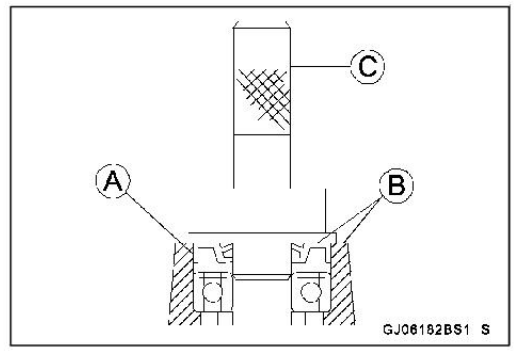
★If they do not turn smoothly, remove the bearings and collar and visually inspect the wheel and collar.

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.
- Apply grease to the grease seal lips.

**Special Tool - Bearing Driver Set [C]: 57001-1129**

- Install the removed parts.

★In case of installing hub bearing, inspect wheel rotation sensor air gap after wheel installation (see Wheel Rotation Sensor Air Gap Inspection(12-35)).




### *Hub Bearing Inspection*

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.

**NOTE**

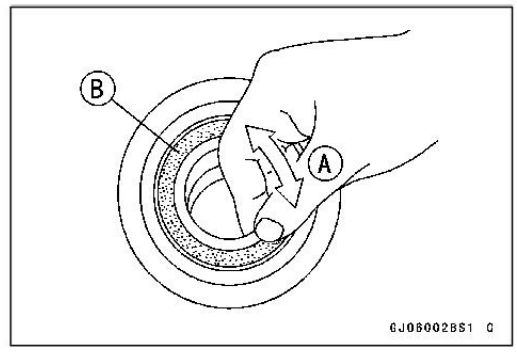
○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*

- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.




### *Hub Bearing Lubrication*

**NOTE**

○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

# Final Drive

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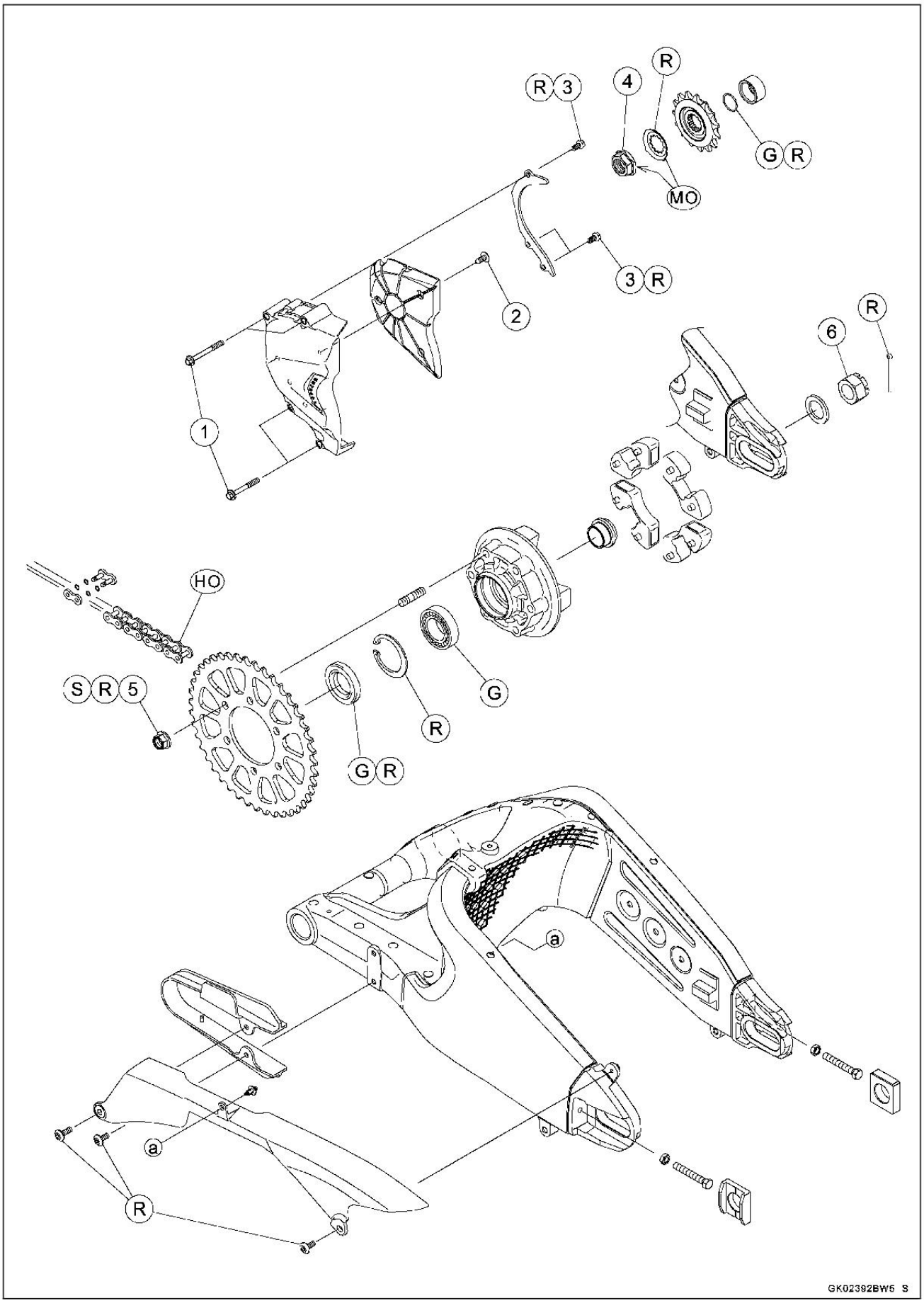
## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Engine Sprocket Cover Bolts | 10 | 1.0 | 89 in·lb | |
| 2 | Engine Sprocket Cover Damper Screws | 3.5 | 0.36 | 31 in·lb | |
| 3 | Chain Guide Bolts | 12 | 1.2 | 106 in·lb | R |
| 4 | Engine Sprocket Nut | 147 | 15.0 | 108 | MO |
| 5 | Rear Sprocket Nuts | 60 | 6.1 | 44 | R, S |
| 6 | Rear Axle Nut | 130 | 13.3 | 95.9 | |

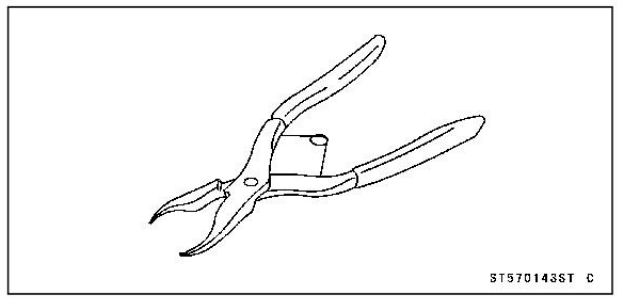
G: Apply grease.
HO: Apply heavy oil.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

## Specifications

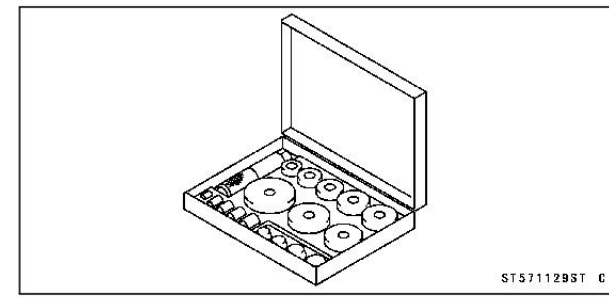
| Item | Standard | Service Limit |
|---|---|---|
| **Drive Chain** | | |
| Drive Chain Slack | 30 – 40 mm (1.2 – 1.6 in.) | – – – |
| Drive Chain Wear (20-link Length) | 317.5 – 318.2 mm (12.50 – 12.53 in.) | 319 mm (12.6 in.) |
| Standard Chain: | | |
| Make | DAIDO | – – – |
| Type | DID 520HV2 | – – – |
| Link | 112 links | – – – |
| Link Pin Outside Diameter (When drive chain replacing) | 5.5 – 5.8 mm (0.22 – 0.23 in.) | – – – |
| Link Plates Outside width (When drive chain replacing) | 17.4 – 17.6 mm (0.685 – 0.693 in.) | – – – |
| **Sprockets** | | |
| Rear Sprocket Warp | TIR 0.4 mm (0.016 in.) or less | TIR 0.5 mm (0.020 in.) |

## Special Tools

**Inside Circlip Pliers:**
**57001-143**




**Bearing Driver Set:**
**57001-1129**



## Drive Chain

### *Drive Chain Slack Inspection*

- Refer to the Drive Chain Slack Inspection (see Drive Chain Slack Inspection(2-40)).

### *Drive Chain Slack Adjustment*

- Refer to the Drive Chain Slack Adjustment (see Drive Chain Slack Adjustment(2-40)).

### *Wheel Alignment Inspection/Adjustment*

- Refer to the Wheel Alignment Inspection (see Wheel Alignment Inspection(2-41)).

### *Drive Chain Wear Inspection*

- Refer to the Drive Chain Wear Inspection (see Drive Chain Wear Inspection(2-42)).

### *Drive Chain Lubrication*

- Refer to the Drive Chain Lubrication Condition Inspection (see Drive Chain Lubrication Condition Inspection(2-39)).

### *Drive Chain Guide Wear Inspection*

- Refer to the Chain Guide Wear Inspection (see Chain Guide Wear Inspection(2-42)).

### *Drive Chain Removal*

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Cover Removal(11-11))
  Swingarm (see Swingarm Removal(13-25))
- Disengage the drive chain from the engine sprocket.
- Remove the drive chain rearward.

### *Drive Chain Installation*

- Install the drive chain, and engage the engine sprocket.
- Install the removed parts.
- Adjust the chain slack after installing the chain (see Drive Chain Slack Adjustment(2-40)).

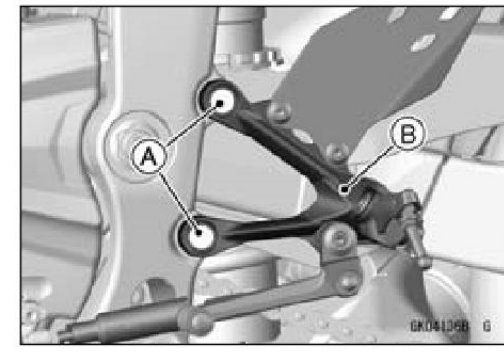
### *Drive Chain Replacement*

**NOTE**

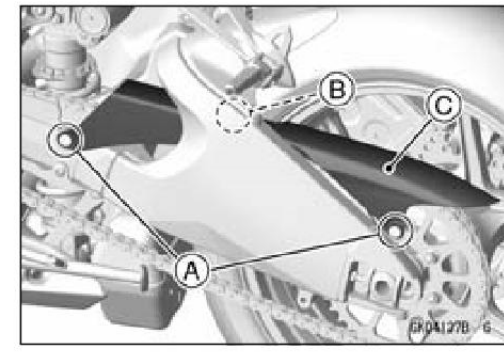
○*Since the drive chain is installed through the swingarm, The chain can not be removed other than by cutting it. Prepare the new link pin, link plate, grease seals, and tools for rejoining the chain.*

## Drive Chain

● Remove:
Front Footpeg Bracket Bolts [A]
Front Footpeg Bracket [B]




● Remove:
Chain Cover Bolts [A]
Quick Rivet [B]
Chain Cover [C]
○To remove the quick rivet, push the central pin.

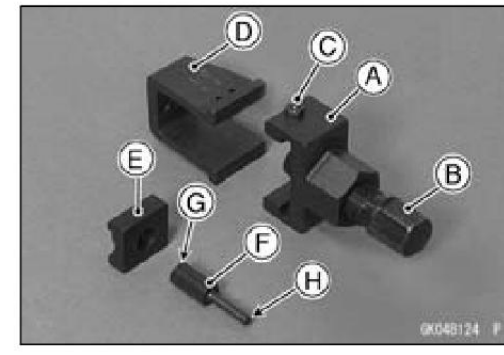



● Using a suitable tool, replace the drive chain.

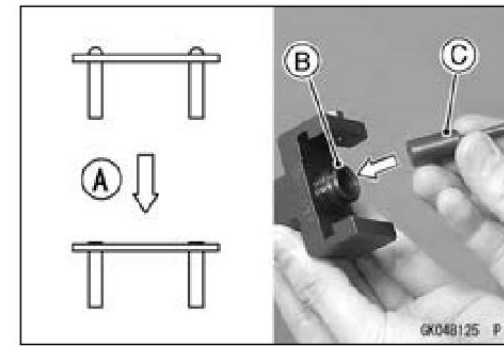
**Recommended Tool - DID Chain Joint "ZJ"**
**Make DAIDO KOGYO**

| *NOTICE* |
| --- |
| **Read the Tool Manual before replacing the chain.** |

● Remove:
Body [A]
Pin Holder [B]
Positioning Pin [C]
"U" Holder [D]
Plate Holder [E]
Cutting and Riveting Pin [F]
Part for Riveting [G]
Part for Cutting [H]

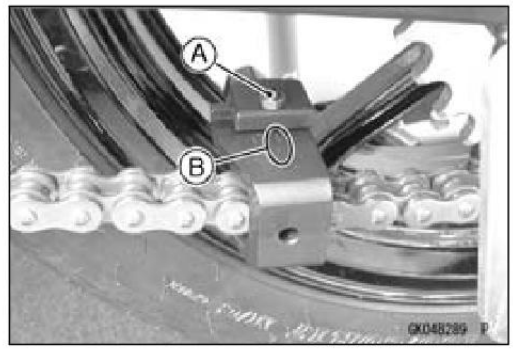



● Grind [A] the heads of the link pin to make it flat.
● Set the cutting and riveting pin [C] in the pin holder [B] as shown.

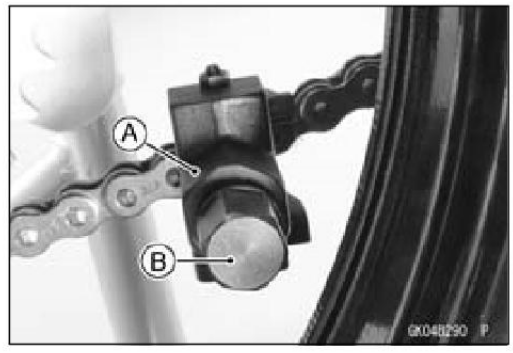


## Drive Chain

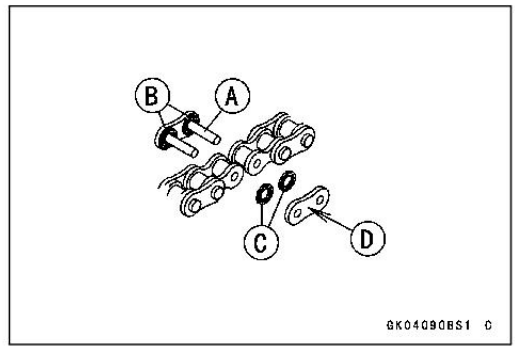
- Set the “U” holder and body, align the positioning pin [A] with the “A mark” [B].
- Tighten the pin holder by hand until the cutting and riveting pin touches the link pin.
- Be sure that the cutting and riveting pin hits center of the link pin.



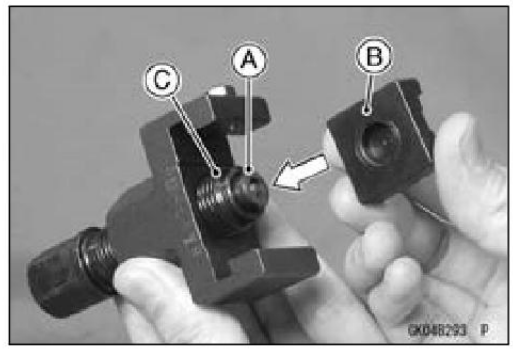

- Hold the body [A] with a wrench.
- Turn the pin holder [B] clockwise with another wrench, and remove the link pin.
- Do the same procedure for removal of the other link pin.



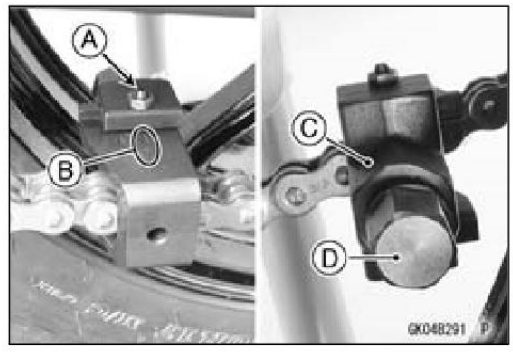

- Engage the new drive chain to the old drive chain, and change the position of the chains by pulling the old chain.
- Remove the old drive chain from the new drive chain.
- Replace the link pin [A], link plate and grease seals [B] [C] with new ones.
- Apply grease to the link pin and grease seals.
- Install the grease seals on the link pin and insert it in the ends of the drive chain.
- Install the link plate so that the mark [D] faces out.




- Set the cutting and riveting pin [A] and plate holder [B] on the pin holder [C] as shown.

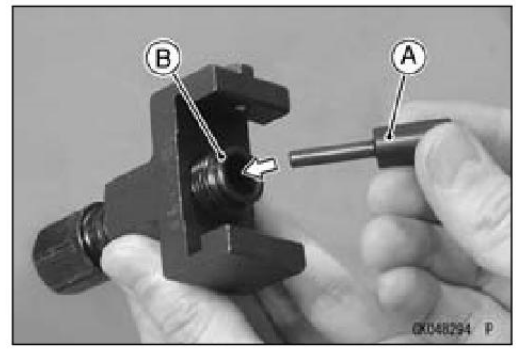



- Set the “U” holder and body, align the positioning pin [A] with the “A mark” [B].
- Hold the body [C] with a wrench.
- Turn the pin holder [D] clockwise with another wrench and press in the link plate on the link pin.
- Remove the “U” holder and body.

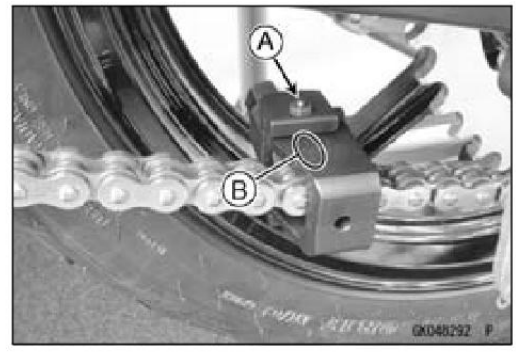


## Drive Chain

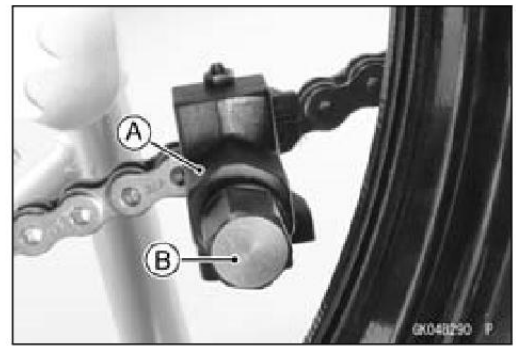
- Set the cutting and riveting pin [A] in the pin holder [B] as shown.




- Set the “U” holder and body, align the positioning pin [A] with the “B mark” [B].
- Tighten the pin holder by hand until the cutting and riveting pin touches the link pin.



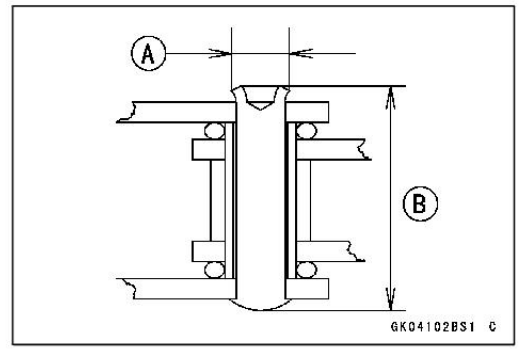

- Hold the body [A] with a wrench.
- Turn the pin holder [B] clockwise with another wrench until the cutting and riveting pin touches the link plate.
- Do the same procedure for removal of the other link pin.




- After riveting, check the ends of the riveted pins for cracks.
- Measure the outside diameter [A] and the length [B] of the link pin.

**Link Pin Outside Diameter**
**Standard: 5.5 – 5.8 mm (0.22 – 0.23 in.)**

**Link Pin Outside Width**
**Standard: 17.4 – 17.6 mm (0.658 – 0.693 in.)**



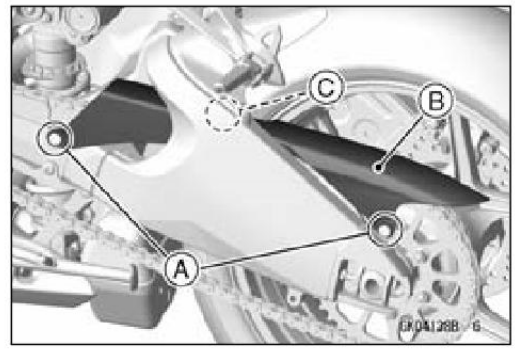

★If the reading is not within the specified range, cut and rejoin the chain again.

- Check that the rollers move smoothly.
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment(2-40)).

## Drive Chain

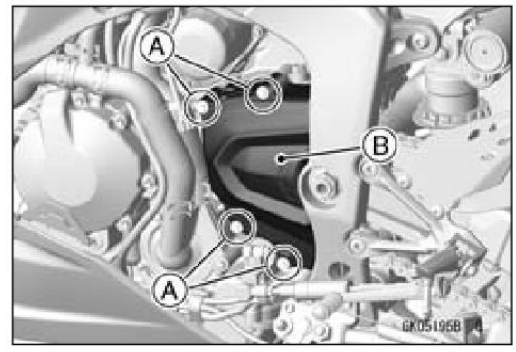
- Replace the chain cover bolts [A] with new ones.
- Install the chain cover [B].
- Set the quick rivet [C] and push the center pin.
- Tighten the chain cover bolts.
- Install the front footpeg bracket.
- Tighten:

**Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**



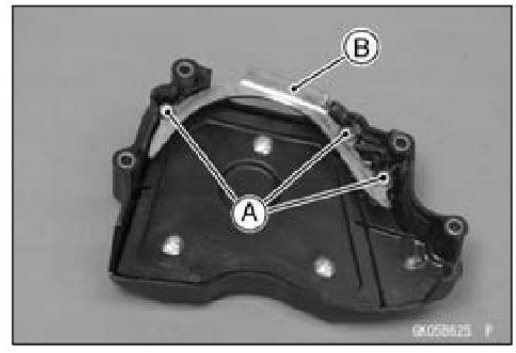
## Sprocket, Coupling

### *Engine Sprocket Cover Removal*

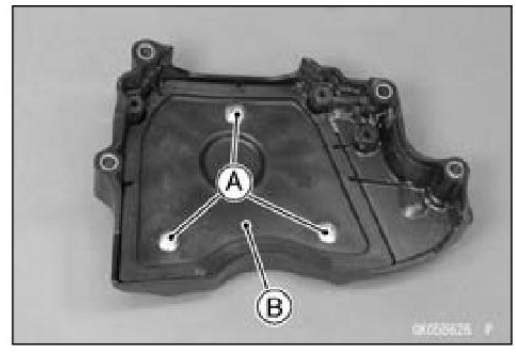



- Remove:
  Engine Sprocket Cover Bolts [A]
  Engine Sprocket Cover [B]

★If necessary, follow the steps below to disassemble the engine sprocket cover.




- Remove:
  Chain Guide Bolts [A]
  Chain Guide [B]




- Remove:
  Engine Sprocket Cover Damper Screws [A]
  Engine Sprocket Cover Damper [B]

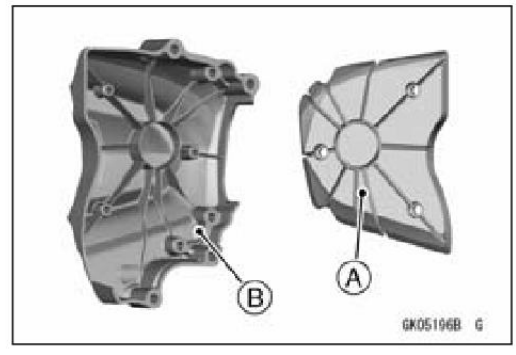
### *Engine Sprocket Cover Installation*

○Assemble the engine sprocket cover if disassembled.

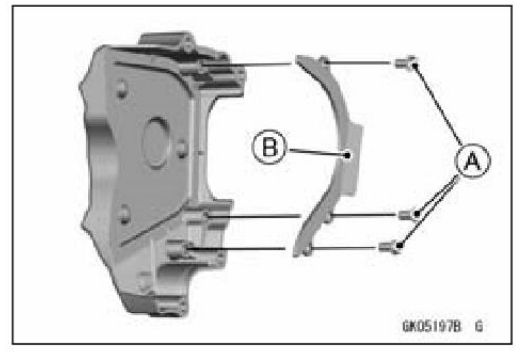
- Install:
  Engine Sprocket Cover Damper [A]

○Fit the grooves of the damper to the ribs of the engine sprocket cover [B].

- Tighten:
  **Torque - Engine Sprocket Cover Damper Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)**



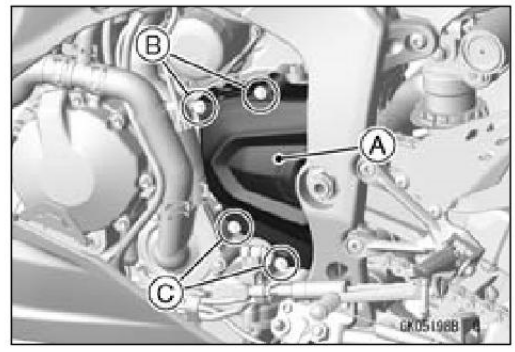

- Replace the chain guide bolts [A] with new ones.
- Install:
  Chain Guide [B]
- Tighten:
  **Torque - Chain Guide Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**



## Sprocket, Coupling

- Install:
  Engine Sprocket Cover [A]
  Engine Sprocket Cover Bolts, 55 mm (2.2 in.) [B]
  Engine Sprocket Cover Bolts, 45 mm (1.8 in.) [C]
- Tighten:

**Torque - Engine Sprocket Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**



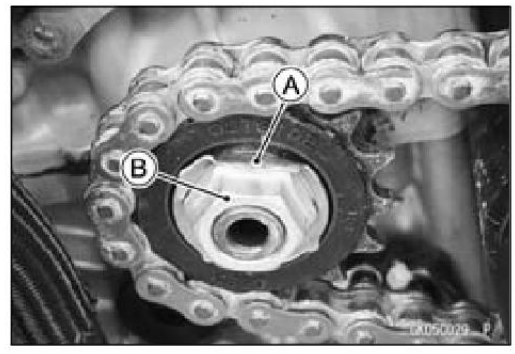

### *Engine Sprocket Removal*

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Cover Removal(11-11))

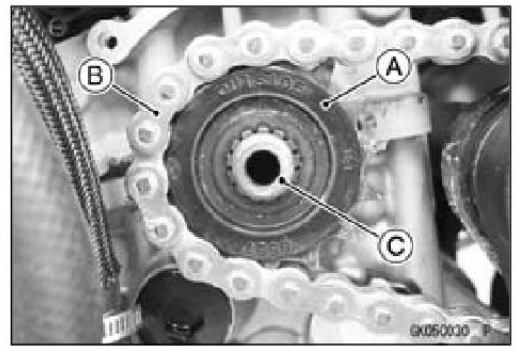
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

**NOTE**

○*When loosening the engine sprocket nut, hold the rear brake on.*



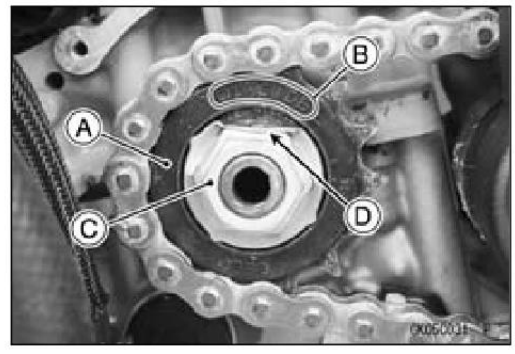

- Raise the rear wheel off the ground with the suitable stand.
- Loosen the drive chain (see Drive Chain Slack Adjustment(2-40)).
- Pull the engine sprocket [A] with drive chain [B] off the output shaft [C].
- Disengage the drive chain from the engine sprocket.




### *Engine Sprocket Installation*

- Replace the sprocket washer and axle cotter pin.
- Engage the drive chain and the engine sprocket [A] beforehand.
- Install the engine sprocket onto the output shaft with the “OUTSIDE” mark [B] facing out.
- Apply molybdenum disulfide oil solution to the threads and seating surface of the engine sprocket nut [C].
- Tighten:

**Torque - Engine Sprocket Nut: 147 N·m (15.0 kgf·m, 108 ft·lb)**




**NOTE**

○*Tighten the engine sprocket nut while applying the rear brake.*

- Bend the washer along one side [D] of the nut.
- Adjust the drive chain slack (see Drive Chain Slack Adjustment(2-40)).

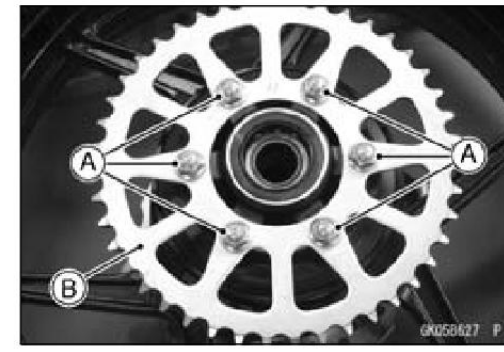
## Sprocket, Coupling

- Install:
  Engine Sprocket Cover (see Engine Sprocket Cover Installation(11-11))

### *Rear Sprocket Removal*

- Remove the rear wheel (see Rear Wheel Removal(10-7)).

| *NOTICE* |
| --- |
| **Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.** |




- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]

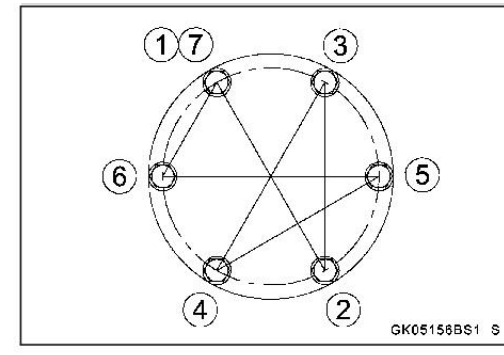
### *Rear Sprocket Installation*

- Install the sprocket facing the tooth number marking [A] outward.
- Replace the rear sprocket nuts with new ones.

- Tighten the rear sprocket nuts following the specified tightening sequence [1 – 7].

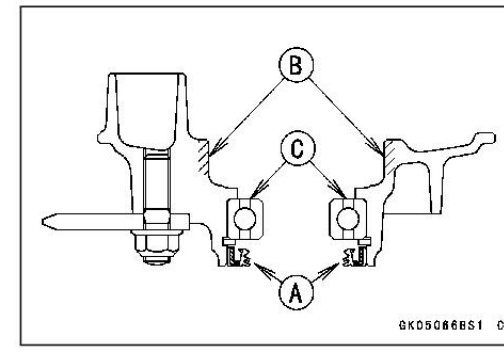
  **Torque - Rear Sprocket Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)**

- Install the rear wheel (see Rear Wheel Installation(10-8)).



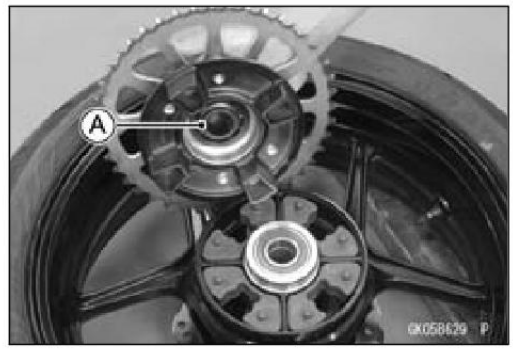

### *Coupling Installation*

- Apply grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]
  Ball Bearing [C]



## Sprocket, Coupling

- Install:
  Collar [A]
  Coupling



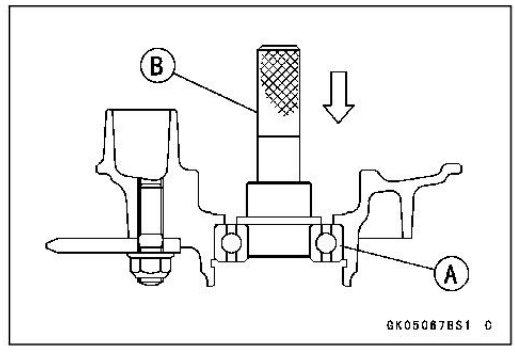

### *Coupling Bearing Removal*

- Remove:
  Coupling
  Grease Seal
  Circlip [A]

  **Special Tool - Inside Circlip Pliers: 57001-143**

- Remove the bearing [A] by tapping from the wheel side.

  **Special Tool - Bearing Driver Set [B]: 57001-1129**



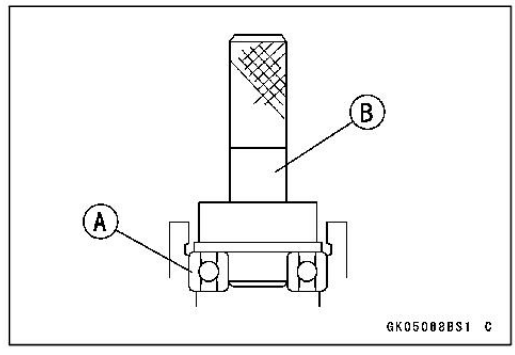

### *Coupling Bearing Installation*

- Replace the bearing [A] with a new one.
- Press in the bearing until it is bottomed.

  **Special Tool - Bearing Driver Set [B]: 57001-1129**

- Pack the bearing with grease.
- Replace the circlip with a new one.

  **Special Tool - Inside Circlip Pliers: 57001-143**




- Replace the grease seal with a new one.
- Press in the grease seal so that the seal surface is flush with the end of the hole.

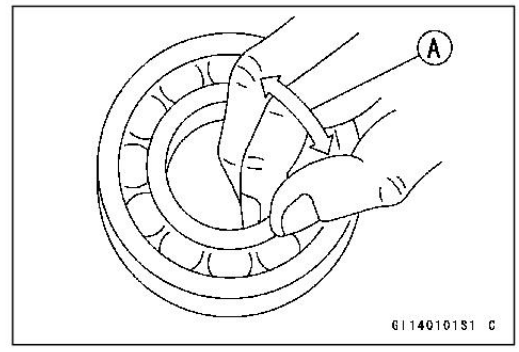
  **Special Tool - Bearing Driver Set: 57001-1129**

- Apply grease to the grease seal lips.

## Sprocket, Coupling

### *Coupling Bearing Inspection*

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.




**NOTE**

○*It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.*

- Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.

★If the bearing play, roughness or binding is found, replace the bearing.

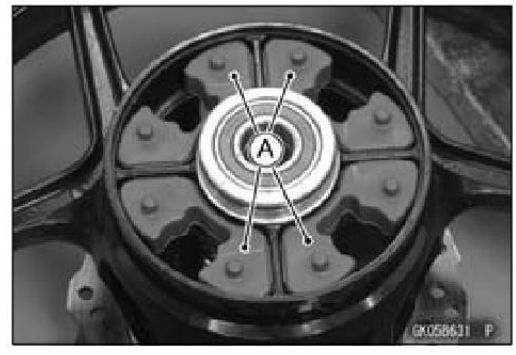
### *Coupling Bearing Lubrication*

- Pack the bearing with grease. Turn the bearing around by hand a few times to make sure the grease is distributed uniformly inside the bearing.

### *Coupling Damper Inspection*

- Remove:
  Coupling
- Inspect the rubber dampers [A] for any damage or deterioration.

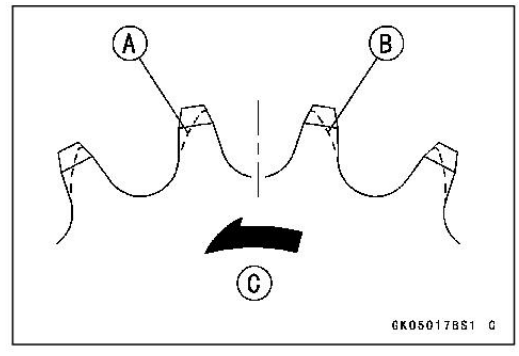
★If any damage or deterioration is found, replace the dampers.




### *Sprocket Wear Inspection*

- Visually inspect the engine and rear sprocket teeth for wear and damage.

★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection(2-42)).
  Worn Tooth (Engine Sprocket) [A]
  Worn Tooth (Rear Sprocket) [B]
  Direction of Rotation [C]



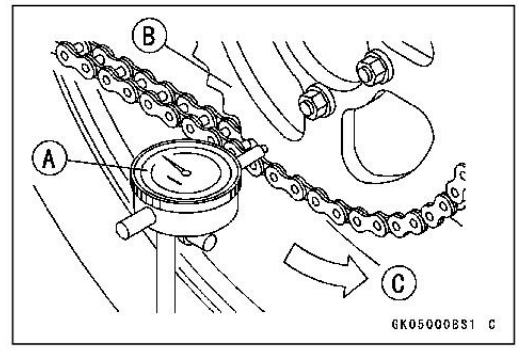

**NOTE**

○*If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.*

### *Rear Sprocket Warp Inspection*

- Raise the rear wheel off the ground with the suitable stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.




**Rear Sprocket Warp**

**Standard: TIR 0.4 mm (0.016 in.) or less**

**Service Limit: TIR 0.5 mm (0.020 in.)**

# Brakes

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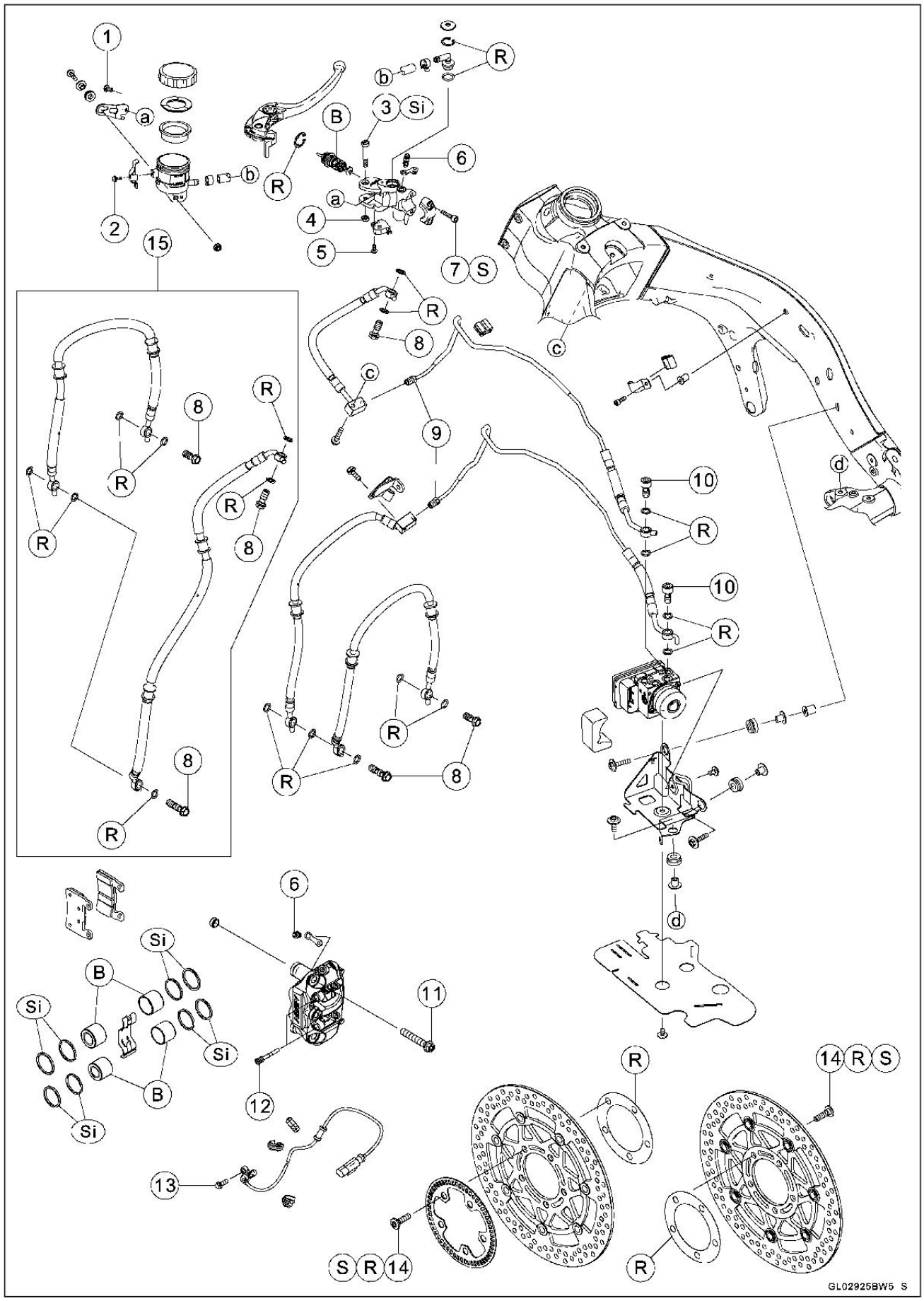
## Exploded View



## Exploded View

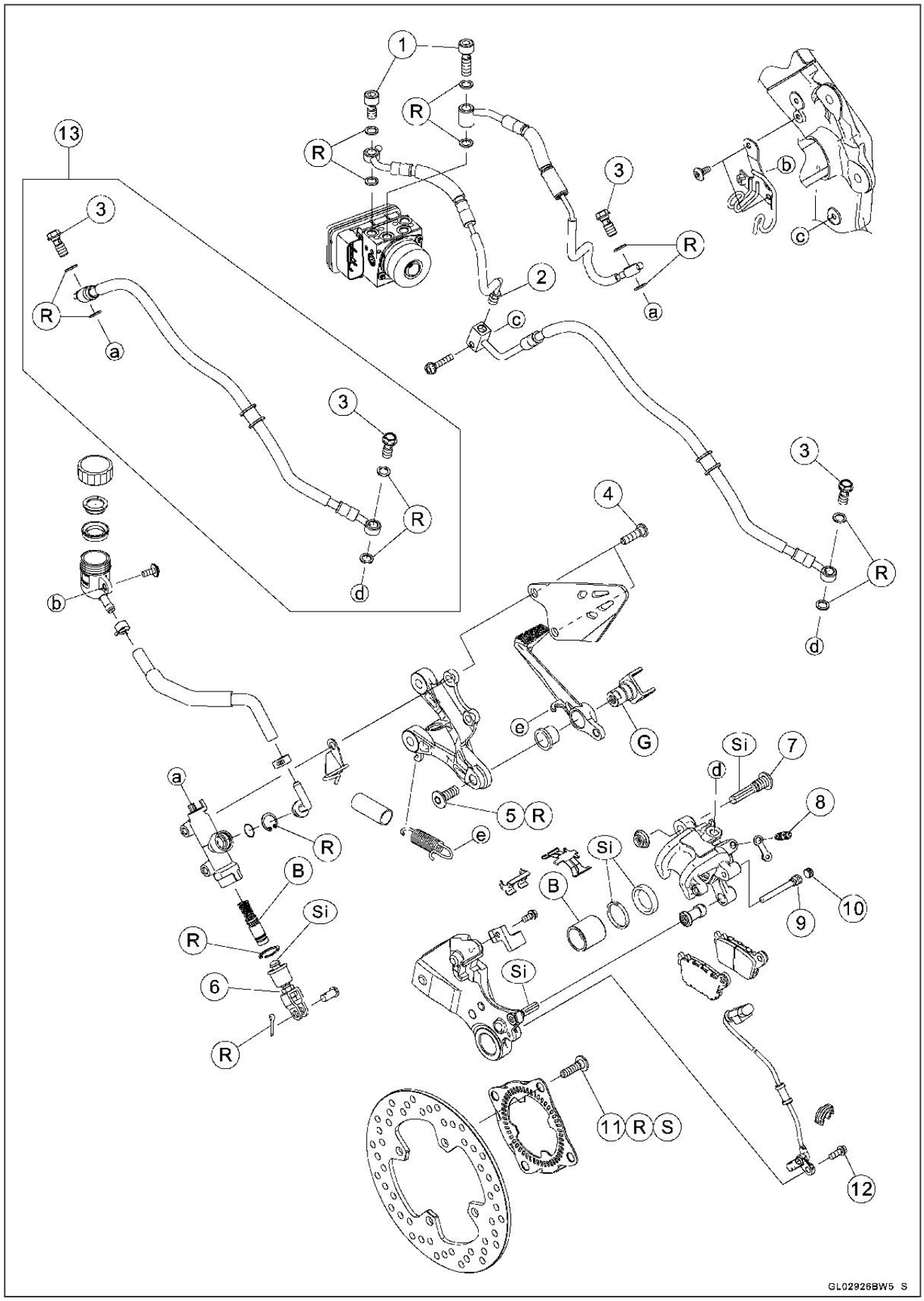
| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Front Brake Reservoir Bracket Bolt | 9.0 | 0.92 | 80 in·lb | |
| 2 | Front Brake Reservoir Cap Stopper Screw | 1.2 | 0.12 | 11 in·lb | |
| 3 | Brake Lever Pivot Bolt | 1.0 | 0.10 | 8.9 in·lb | Si |
| 4 | Brake Lever Pivot Bolt Locknut | 5.9 | 0.60 | 52 in·lb | |
| 5 | Front Brake Light Switch Screw | 1.2 | 0.12 | 11 in·lb | |
| 6 | Bleed Valves | 8.0 | 0.82 | 71 in·lb | |
| 7 | Front Master Cylinder Clamp Bolts | 11 | 1.1 | 97 in·lb | S |
| 8 | Brake Hose Banjo Bolts | 25 | 2.5 | 18 | |
| 9 | Brake Pipe Joint Nuts | 14.5 | 1.48 | 10.7 | |
| 10 | Brake Pipe Banjo Bolts | 23 | 2.3 | 17 | |
| 11 | Front Caliper Bolts | 35 | 3.6 | 26 | |
| 12 | Front Brake Pad Pins | 17.2 | 1.75 | 12.7 | |
| 13 | Wheel Rotation Sensor Bolt | 8.0 | 0.82 | 71 in·lb | |
| 14 | Brake Disc Bolts | 28 | 2.9 | 21 | R, S |

15. ZX636K
B: Apply brake fluid.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

**NOTE**

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Brake Pipe Banjo Bolts | 23 | 2.3 | 17 | |
| 2 | Brake Pipe Joint Nut | 14.5 | 1.48 | 10.7 | |
| 3 | Brake Hose Banjo Bolts | 25 | 2.5 | 18 | |
| 4 | Rear Master Cylinder Bolts | 25 | 2.5 | 18 | |
| 5 | Brake Pedal Bolt | 35 | 3.6 | 26 | R |
| 6 | Rear Master Cylinder Push Rod Locknut | 17.2 | 1.75 | 12.7 | |
| 7 | Rear Caliper Pin Bolt | 27 | 2.8 | 20 | |
| 8 | Bleed Valve | 8.0 | 0.82 | 71 in·lb | |
| 9 | Rear Brake Pad Pin | 17.2 | 1.75 | 12.7 | |
| 10 | Rear Brake Pad Pin Plug | 2.5 | 0.25 | 22 in·lb | |
| 11 | Brake Disc Bolts | 28 | 2.9 | 21 | R, S |
| 12 | Wheel Rotation Sensor Bolt | 8.0 | 0.82 | 71 in·lb | |

13. ZX636K
B: Apply brake fluid.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

**NOTE**

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

## Specifications

| Item | Standard | Service Limit |
|---|---|---|
| **Brake Lever, Brake Pedal** | | |
| Brake Lever Position | 6-way adjustable (to suit rider) | – – – |
| Brake Lever Free Play | Non-adjustable | – – – |
| Pedal Free Play | Non-adjustable | – – – |
| Pedal Position | About 75 mm (2.95 in.) below top of footpeg | – – – |
| **Brake Pads** | | |
| Lining Thickness: | | |
| Front | 4 mm (0.16 in.) | 1 mm (0.04 in.) |
| Rear | 5 mm (0.20 in.) | 1 mm (0.04 in.) |
| **Brake Discs** | | |
| Thickness: | | |
| Front | 4.8 – 5.2 mm (0.19 – 0.20 in.) | 4.5 mm (0.18 in.) |
| Rear | 4.8 – 5.2 mm (0.19 – 0.20 in.) | 4.5 mm (0.18 in.) |
| Runout: | | |
| Front | TIR 0.15 mm (0.0059 in.) or less | TIR 0.3 mm (0.013 in.) |
| Rear | TIR 0.20 mm (0.0079 in.) or less | TIR 0.3 mm (0.013 in.) |
| **Brake Fluid** | | |
| Grade: | | |
| Front | DOT4 | – – – |
| Rear | DOT4 | – – – |
| **ABS (Equipped Models)** | | |
| ABS Hydraulic Unit: | | |
| Make | BOSCH | – – – |
| Wheel Rotation Sensor Air Gap: | | |
| Front | 0.60 – 1.33 mm (0.02 – 0.05 in.) | – – – |
| Rear | 0.65 – 1.28 mm (0.03 – 0.05 in.) | – – – |

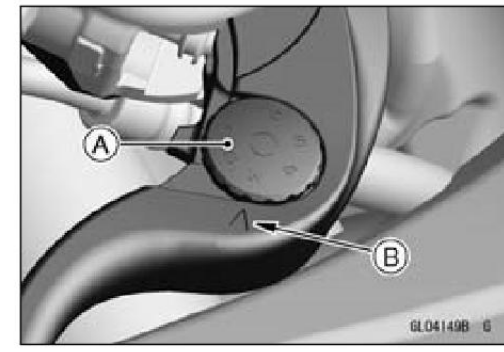
## Brake Lever, Brake Pedal

### *Brake Lever Position Adjustment*

The brake lever adjuster has 6 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever.

○The distance from the grip to the lever is minimum at number 6 and maximum at number 1.



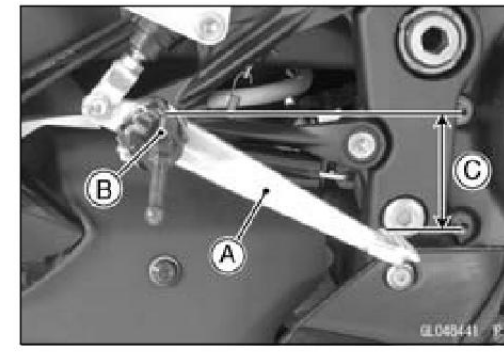

### *Brake Pedal Position Inspection*

- Check that the brake pedal [A] is in the correct position.
  Footpeg [B]

**Pedal Position**

**Standard: About 75 mm (2.95 in.) [C] below top of footpeg**

★If it is incorrect, adjust the brake pedal position.




### *Brake Pedal Position Adjustment*

**NOTE**

○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.*

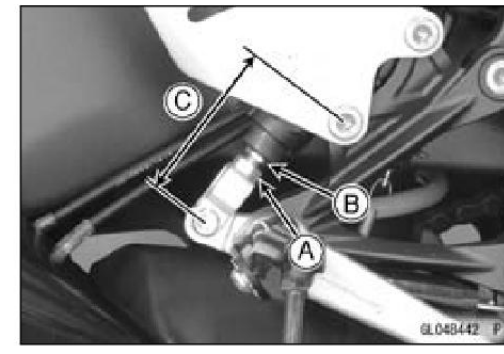
- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★If the length [C] shown is **70 ±1 mm (2.8 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

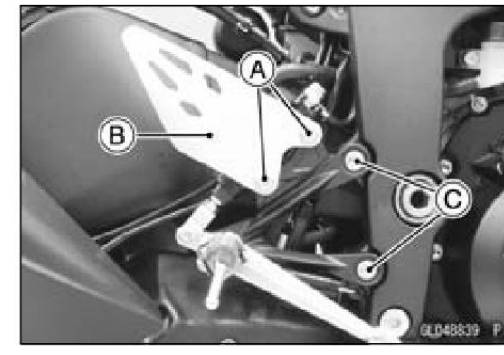
**Torque - Rear Master Cylinder Push Rod Locknut: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)**

- Check the brake light switch operation (see Brake Light Switch Operation Inspection(2-55)).



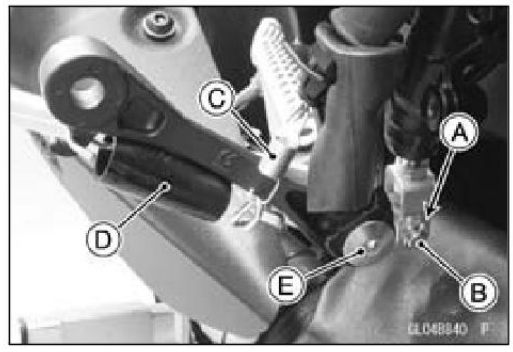

### *Brake Pedal Removal*

- Remove:
  Rear Master Cylinder Bolts [A]
  Foot Guard [B]
  Front Footpeg Bracket Bolts [C]



## Brake Lever, Brake Pedal

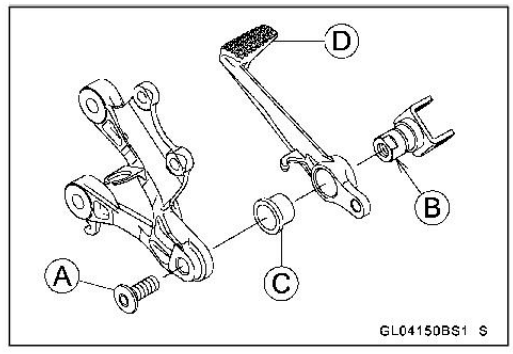
- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Brake Light Switch Spring [C]
  Return Spring [D]
- Remove the brake pedal bolt [E] and take out the brake pedal.



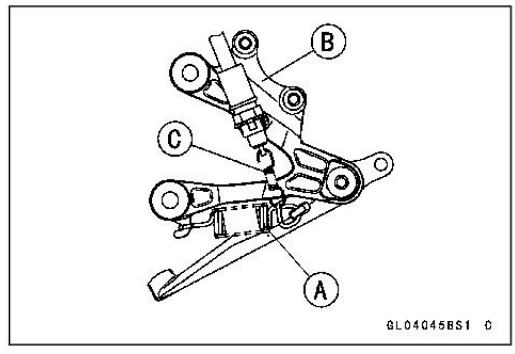

### *Brake Pedal Installation*

- Replace the brake pedal bolt [A].
- Apply grease to the footpeg pivot shaft [B].
- Install:
  Bushing [C]
  Brake Pedal [D]
- Tighten:

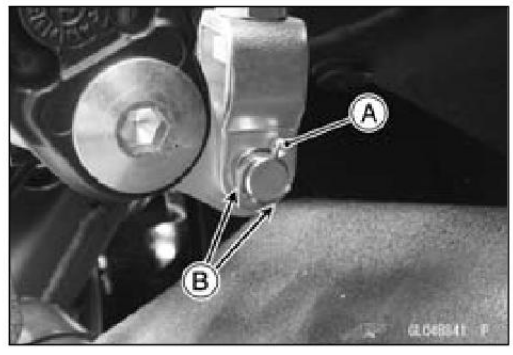
**Torque - Brake Pedal Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)**



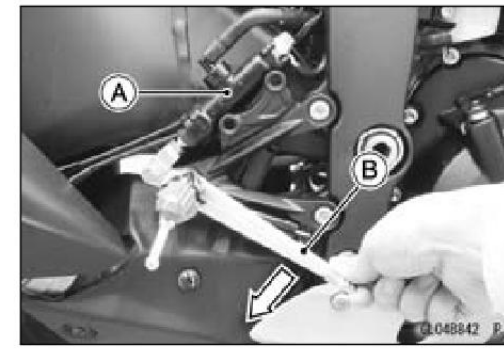

- Hook the return spring [A] on the brake pedal and front footpeg bracket [B] as shown.
- Hook the rear brake light switch spring [C] on the switch and return spring as shown.




- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].



## Brake Lever, Brake Pedal




- Install the front footpeg bracket.
- Tighten:

**Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Install the rear master cylinder [A] and foot guard.

**NOTE**

*○Depress the brake pedal [B] and then align the holes of the master cylinder.*

*○After installation, check that the rear brake light switch spring is hooked on the return spring.*

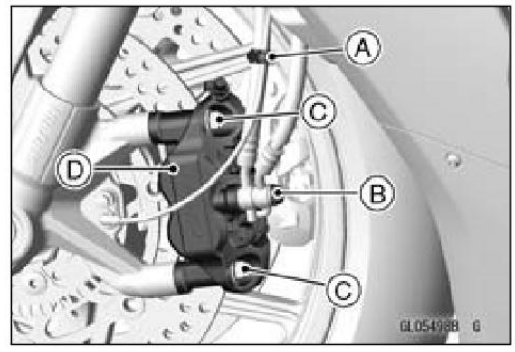
- Apply a non-permanent locking agent to the threads of the front bracket bolts, and tighten them.

**Torque - Rear Master Cylinder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Check the brake pedal position (see Brake Pedal Position Inspection (12-9)).

## Calipers

### *Front Caliper Removal*

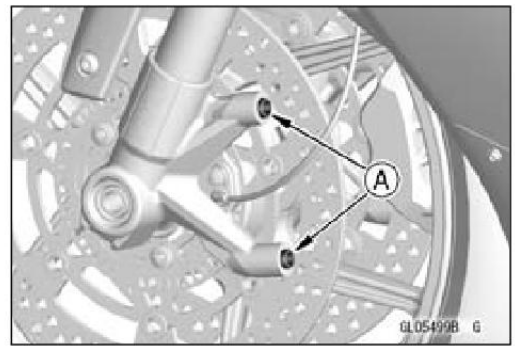



- Remove:
  Clamp [A]
- Loosen the brake hose banjo bolt [B], and tighten it loosely to prevent fluid spillage.
- Remove the front caliper bolts [C], and detach the caliper [D] from the front fork.
- Remove the banjo bolt and brake hose from the caliper (see Brake Hose and Pipe Replacement(2-47)).

***NOTICE***

**Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.**

### *Front Caliper Installation*




- Be sure to install the collars [A] on the fork leg.
- Replace the washers that are on each side of the hose fitting with new ones.
- Install:
  Front Caliper
  Brake Hose Lower End
  New Washers
  ○Touch the hose end to the stopper on the caliper body.
  ○Avoid sharp bending, kinking, flatting or twisting.
- Tighten:

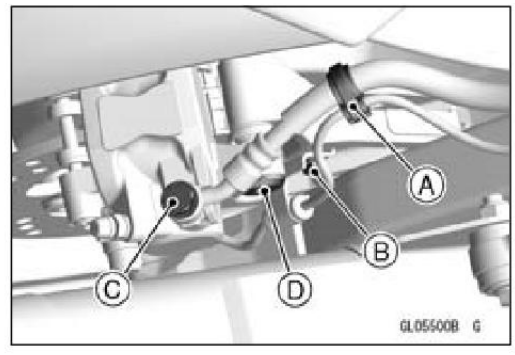
**Torque - Front Caliper Bolts: 35 N·m (3.6 kgf·m, 26 ft·lb)**
**Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Check the fluid level in the brake fluid reservoir.
- Bleed the brake line (see Brake Line Bleeding(12-24)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

**⚠ WARNING**

**After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.**

### *Rear Caliper Removal*

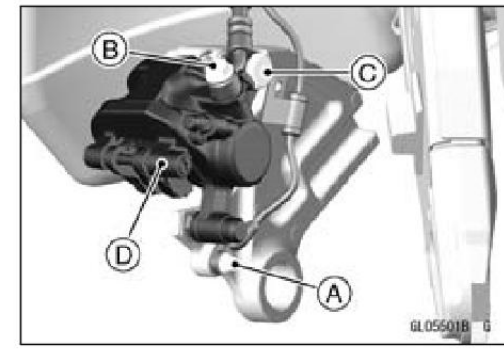



- Remove:
  Clamp [A]
  Bolt [B]
- Loosen the brake hose banjo bolt [C], and tighten it loosely to prevent fluid spillage.
- Loosen the rear caliper pin bolt [D] if necessary.
- Remove the rear wheel (see Rear Wheel Removal(10-7)).

## Calipers

- Remove the rear wheel rotation sensor bolt [A] to free the sensor.
- Remove the brake hose banjo bolt [B] and washers.

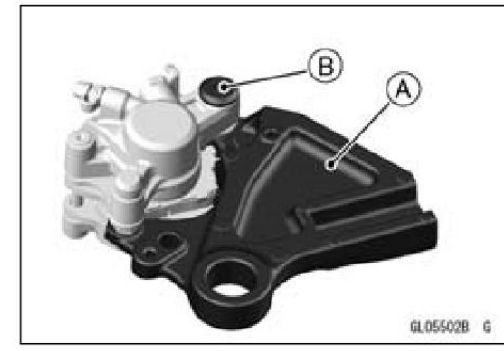
| *NOTICE* |
| --- |
| **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |




- Remove:
  Rear Caliper Pin Bolt [C]
  Rear Caliper [D]

### *Rear Caliper Installation*

- Install the caliper bracket [A] and tighten the rear caliper pin bolt [B] temporary.
- Install:
  Rear Wheel (see Rear Wheel Installation(10-8))
  Rear Wheel Rotation Sensor (see Rear Wheel Rotation Sensor Installation(12-34))

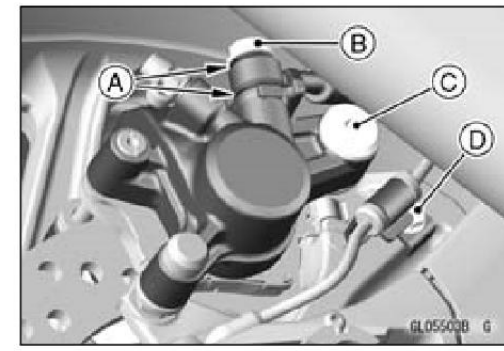



- Replace the washers [A] that are on each side of hose fitting with new ones.
- Install:
  Brake Hose Lower End
  New Washers

○Touch the hose end to the stopper on the caliper body.
○Avoid sharp bending, kinking, flatting or twisting.

- Tighten:

**Torque - Brake Hose Banjo Bolt [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Rear Caliper Pin Bolt [C]: 27 N·m (2.8 kgf·m, 20 ft·lb)**




- Tighten the bolt [D] for the sensor bracket.
- Check the fluid level in the brake fluid reservoir.
- Bleed the brake line (see Brake Line Bleeding(12-24)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

| ⚠ WARNING |
| --- |
| **After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.** |

### *Front Caliper Disassembly*

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-51)).

### *Front Caliper Assembly*

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-51)).

## Calipers

### *Rear Caliper Disassembly*

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-51)).

### *Rear Caliper Assembly*

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-51)).

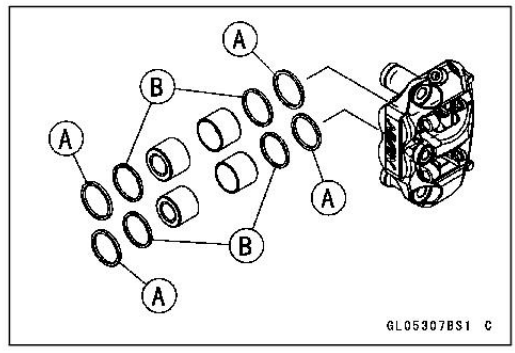
### *Caliper Fluid Seal Damage Inspection*

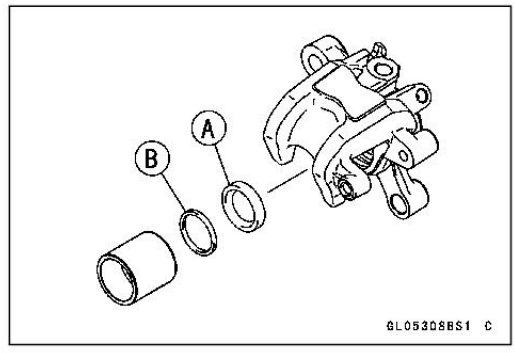
The fluid seal (piston seal) [A] is placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.

○Brake fluid leakage around the pad.
○Brakes overheat.
○Considerable difference in inner and outer pad wear.
○Seal and piston are stuck together.

★If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



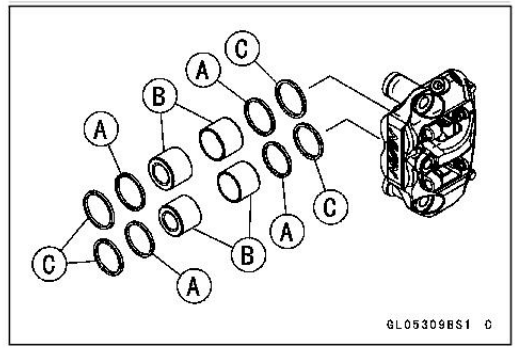



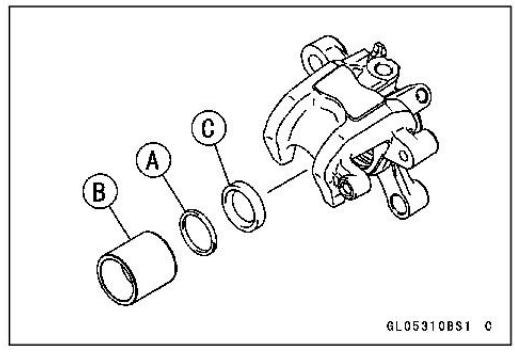

### *Caliper Dust Seal Damage Inspection*

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]
Fluid Seals [C]



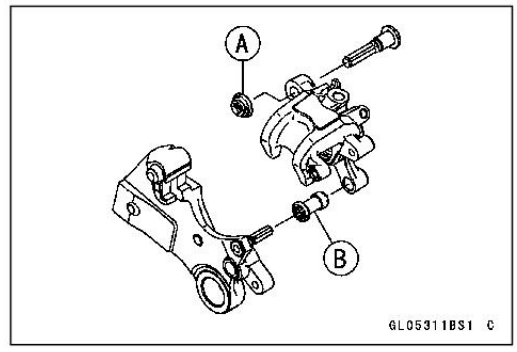



## Calipers

### *Rear Caliper Dust Boot and Friction Boot Damage Inspection*

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

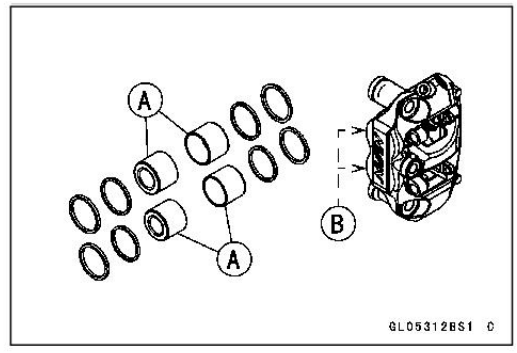
★If they show any damage, replace it.

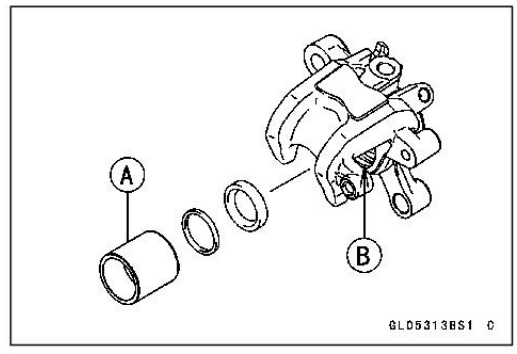



### *Caliper Piston and Cylinder Damage Inspection*

- Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.



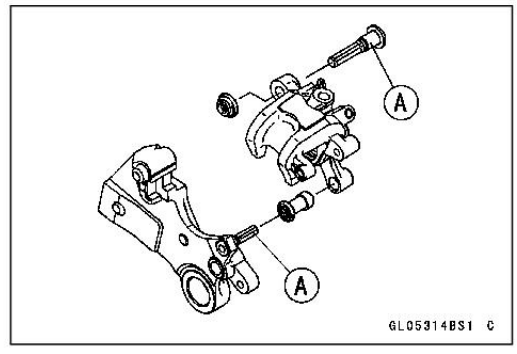

### *Rear Caliper Holder Shaft Wear Inspection*

The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber boots are not damaged.

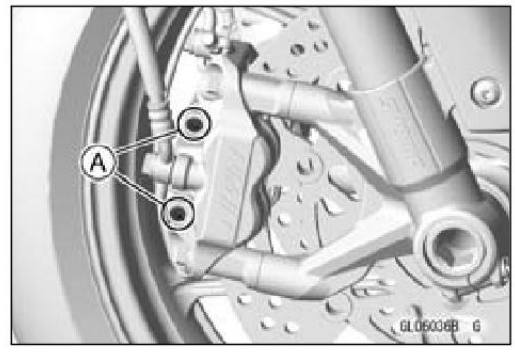
★If the rubber boot is damaged, replace the rubber boot. To replace the rubber boot, remove the pads and the caliper bracket.

★If the caliper holder shaft is damage, replace the caliper bracket.



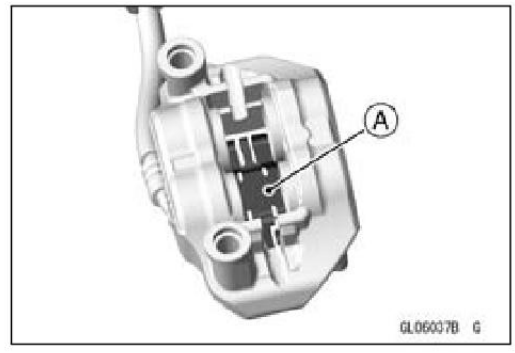
## Brake Pads

### *Front Brake Pad Removal*

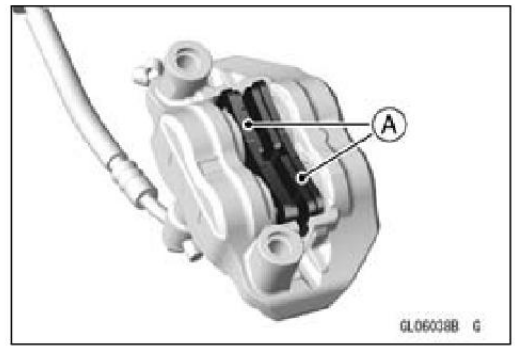



- Loosen the pad pins [A].
- Remove the front caliper with the hose installed (see Front Caliper Removal(12-12)).
- Remove:
  Pad Pins
  Brake Pads

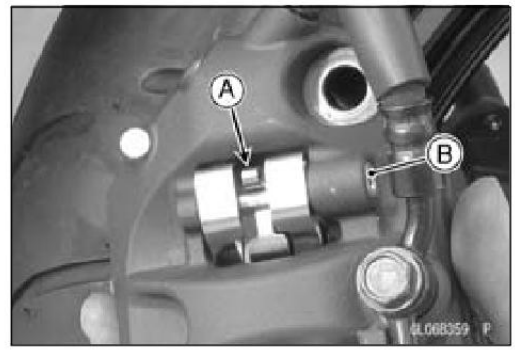
### *Front Brake Pad Installation*




- Check that the pad spring [A] is in place on the caliper.
  ○Install the pad spring so that its arrow mark is pointed to upward.
- Push the caliper pistons in by hand as far as they will go.




- Install the brake pads [A] on the pad spring correctly.
  ○Fit the pad into the groove of the caliper.




- Tighten the pad pins temporarily.
  ○Push down the pin holder [A] and insert the pad pin [B].
- Install the front caliper (see Front Caliper Installation(12-12)).
- Tighten:

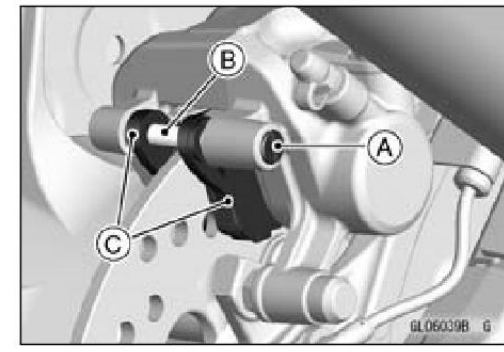
**Torque - Front Brake Pad Pins: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)**

**⚠ WARNING**

**After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.**

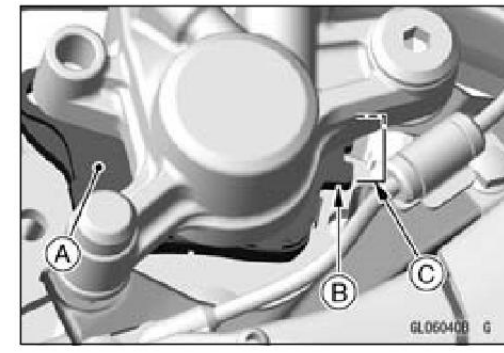
## Brake Pads

### *Rear Brake Pad Removal*




- Remove:
  Pad Pin Plug [A]
  Pad Pin [B]
  Brake Pads [C]

### *Rear Brake Pad Installation*




- Check that the pad spring is in place on the caliper.
- Push the caliper piston in as far as it will go.
- Install the piston side pad [A] first, and then another pad.
- ○Fit the brake pad end [B] into the recess [C] of the caliper bracket.
- Install the pad pin and the plug.
- Tighten:

**Torque - Rear Brake Pad Pin: 17.2 N·m (1.75 kgf·m, 12.7 ft·lb)**
**Rear Brake Pad Pin Plug: 2.5 N·m (0.25 kgf·m, 22 in·lb)**

**⚠ WARNING**

**After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.**

### *Brake Pad Wear Inspection*

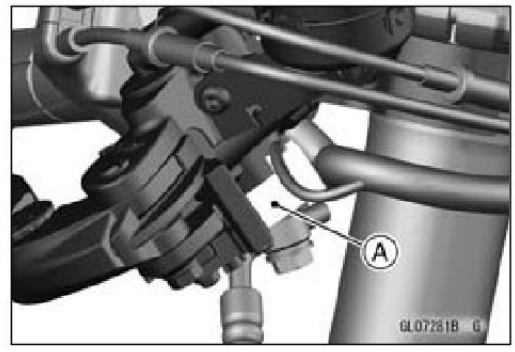
- Refer to the Brake Pad Wear Inspection (see Brake Pad Wear Inspection(2-54)).

## Master Cylinder

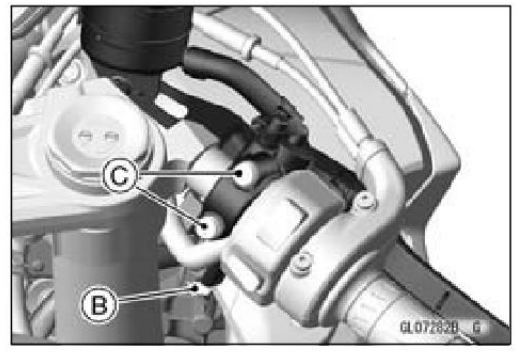
### *Front Master Cylinder Removal*

- Disconnect the front brake light switch connector [A].
- Loosen the brake hose banjo bolt [B] and remove the brake hose from the master cylinder.

| *NOTICE* |
| --- |
| **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |

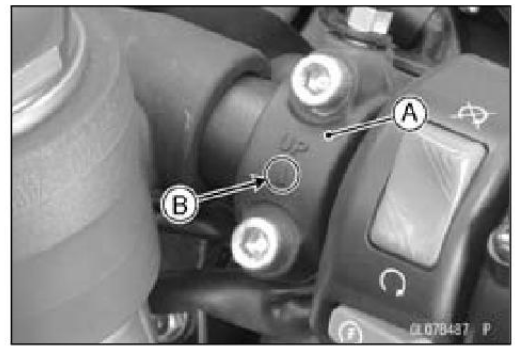



- Remove the clamp bolts [C], and take off the master cylinder as an assembly with the reservoir, brake lever, and front brake light switch installed.



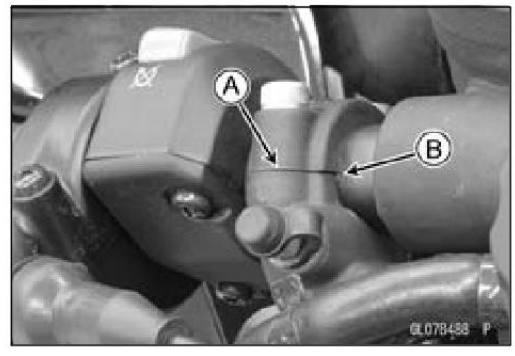

### *Front Master Cylinder Installation*

- Install the master cylinder clamp [A] so that the arrow mark [B] faces upward.

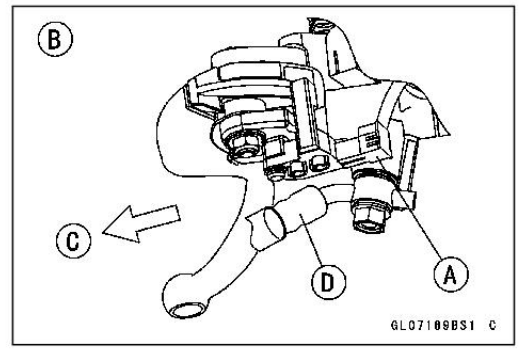



- Set the front master cylinder to match its mating surface [A] to the punch mark [B] of the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

**Torque - Front Master Cylinder Clamp Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)**



## Master Cylinder




- Connect the front brake light switch connector [A] as shown.
  Left Side View [B]
  Front [C]
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose [D].

○Touch the brake hose to the stopper of the front master cylinder.

- Tighten:

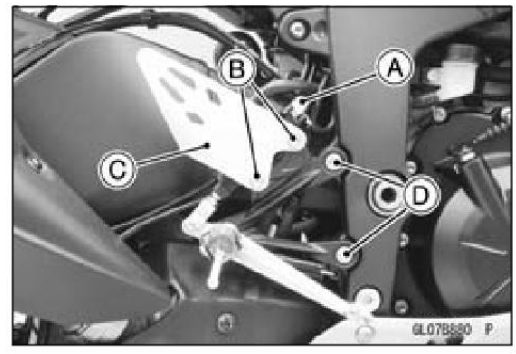
**Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Tighten the front brake reservoir mounting nut.
- Bleed the brake line (see Brake Line Bleeding(12-24)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

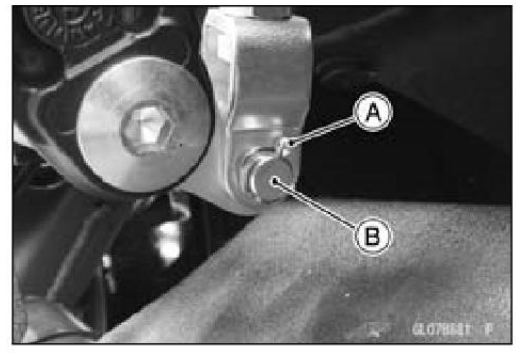
### *Rear Master Cylinder Removal*

- Loosen the brake hose banjo bolt [A] and remove the brake hose from the master cylinder.

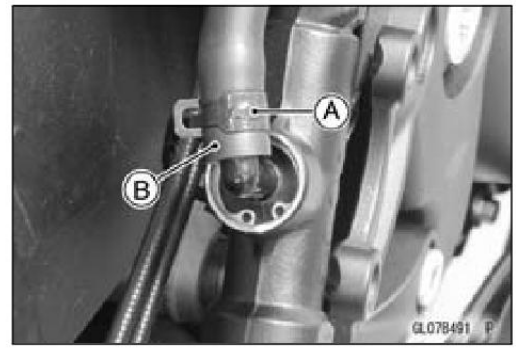
| *NOTICE* |
| --- |
| **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |




- Remove:
  Rear Master Cylinder Bolts [B]
  Foot Guard [C]
  Front Footpeg Bracket Bolts [D]



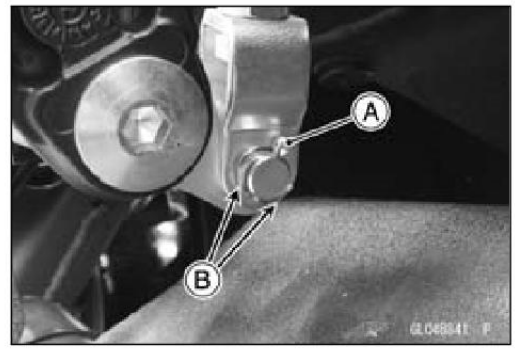

- Remove:
  Cotter Pin [A]
  Joint Pin [B]



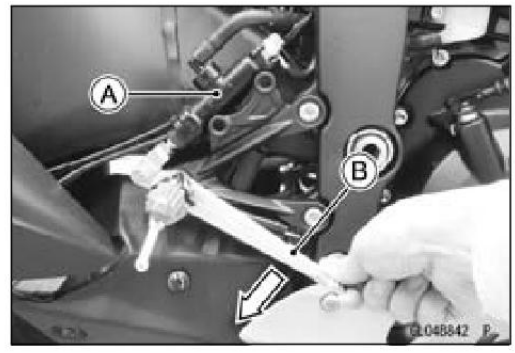

- Slide the reservoir hose lower end clamp [A].
- Remove the reservoir hose lower end [B], and drain the brake fluid into a container.

## Master Cylinder

### *Rear Master Cylinder Installation*




- Replace the cotter pin [A] with a new one.
- Insert the cotter pin and bend the pin ends [B].
- Install the reservoir hose lower end to the rear master cylinder.




- Install:
  Front Footpeg Bracket
  Rear Master Cylinder [A]
  Foot Guard
- Tighten:

**Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Rear Master Cylinder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

**NOTE**

○*Depress the brake pedal [B] and then align the holes of the master cylinder.*
○*After installation, check that the rear brake light switch spring is hooked on the return spring.*

- Replace the washers that are on each side of hose fitting with new ones.
- Install the brake hose.

○Touch the brake hose to the stopper of the rear master cylinder.

- Tighten:

**Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Bleed the brake line (see Brake Line Bleeding(12-24)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

### *Front Master Cylinder Disassembly*

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-49)).

### *Rear Master Cylinder Disassembly*

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-49)).

### *Master Cylinder Assembly*

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-49)).

## Master Cylinder

### *Master Cylinder Inspection (Visual Inspection)*

- Remove the master cylinders (see Front Master Cylinder Removal(12-18)) (see Rear Master Cylinder Removal(12-19)).
- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement(2-49)).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

★If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

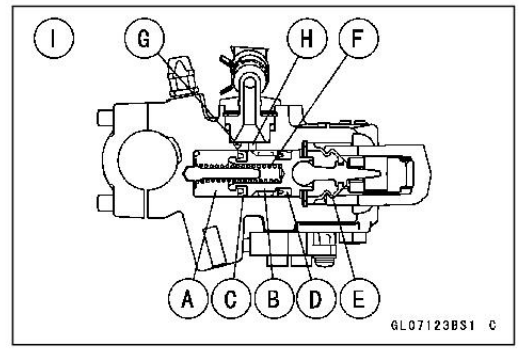
- Check the piston return springs [F] for any damage.

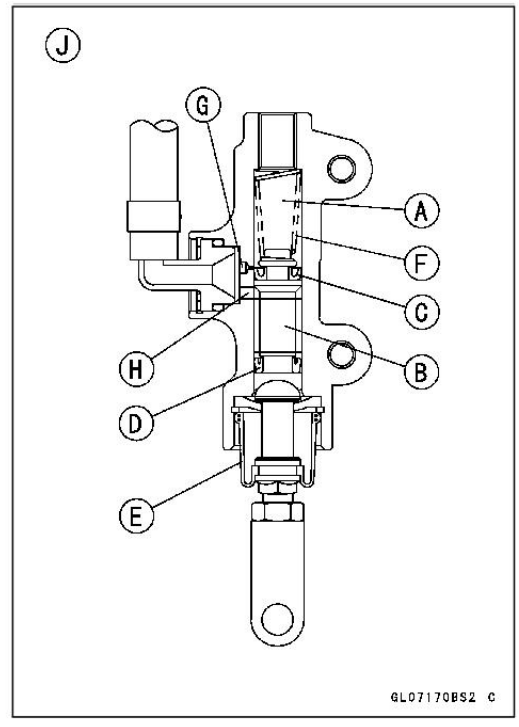
★If the springs are damaged, replace them.

- Check that relief port [G] and supply port [H] are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [I]
Rear Master Cylinder [J]



## Brake Disc

**NOTE**

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

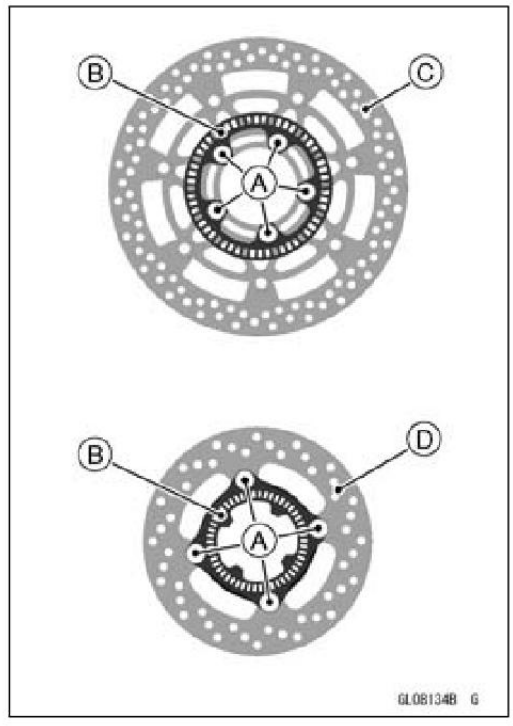
### *Brake Disc Removal*

**Front**

● Remove:
Front Wheel (see Front Wheel Removal(10-6))
Brake Disc Bolts [A]
Wheel Rotation Sensor Rotor [B] (Left Side Disc Only)
Front Brake Disc [C]
Gasket (Under Brake Disc)

**Rear**

● Remove:
Rear Wheel (see Rear Wheel Removal(10-7))
Brake Disc Bolts [A]
Wheel Rotation Sensor Rotor [B]
Rear Brake Disc [D]




### *Brake Disc Installation*

**Front**

● Replace:
Gasket [A]
Brake Disc Bolts [B]

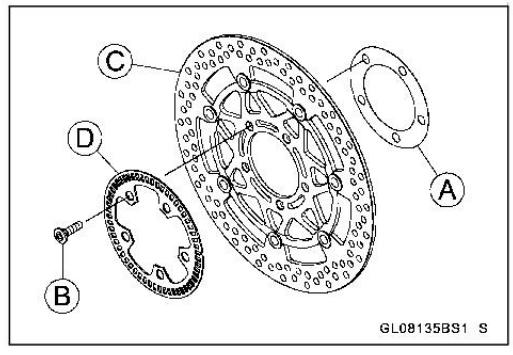
● Install:
Gasket
Brake Disc [C]
Wheel Rotation Sensor Rotor [D] (Left Side Disc Only)

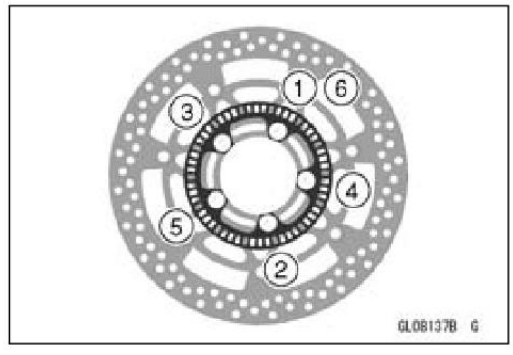
○For the disc and rotor, be sure to face the letter marking outward.

● Tighten:

**Torque - Brake Disc Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)**

○Follow the tightening sequence specified in the figure.



## Brake Disc

**Rear**

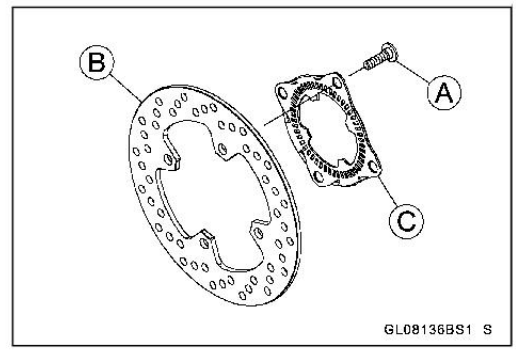
- Replace:
  Brake Disc Bolts [A]
- Install:
  Brake Disc [B]
  Wheel Rotation Sensor Rotor [C]

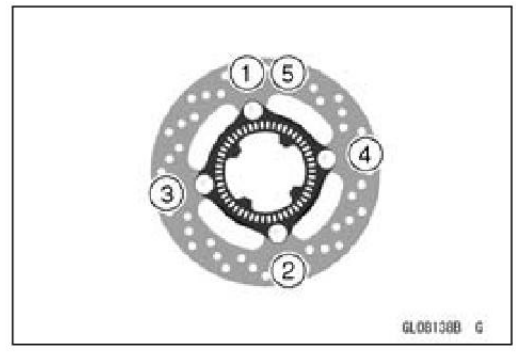
○For the disc and rotor, be sure to face the letter marking outward.

- Tighten:

**Torque - Brake Disc Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)**

○Follow the tightening sequence specified in the figure.

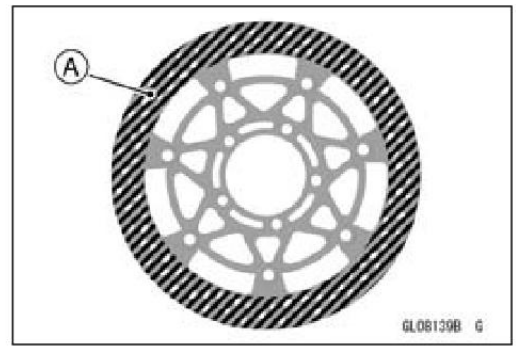



### *Brake Disc Wear Inspection*

- Measure the thickness of each disc at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.
Measuring Area [A]




**Brake Discs Thickness**

**Standard:**

| | |
|---|---|
| **Front** | **4.8 – 5.2 mm (0.19 – 0.20 in.)** |
| **Rear** | **4.8 – 5.2 mm (0.19 – 0.20 in.)** |

**Service Limit:**

| | |
|---|---|
| **Front** | **4.5 mm (0.18 in.)** |
| **Rear** | **4.5 mm (0.18 in.)** |

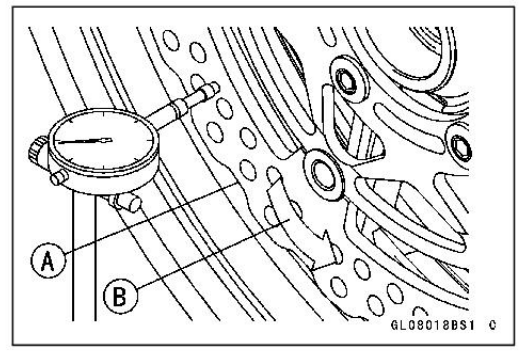
### *Brake Disc Warp Inspection*

- Raise the wheel off the ground with a suitable stand.

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.




**Disc Runout**

**Standard:**

| | |
|---|---|
| **Front** | **TIR 0.15 mm (0.0059 in.) or less** |
| **Rear** | **TIR 0.20 mm (0.0080 in.) or less** |
| **Service Limit:** | **TIR 0.3 mm (0.013 in.)** |

## Brake Fluid

### *Brake Fluid Level Inspection*

● Refer to the Brake Fluid Level Inspection (see Brake Fluid Level Inspection(2-44)).

### *Brake Fluid Change*

● Refer to the Brake Fluid Change (see Brake Fluid Change(2-45)).

### *Brake Line Bleeding*

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

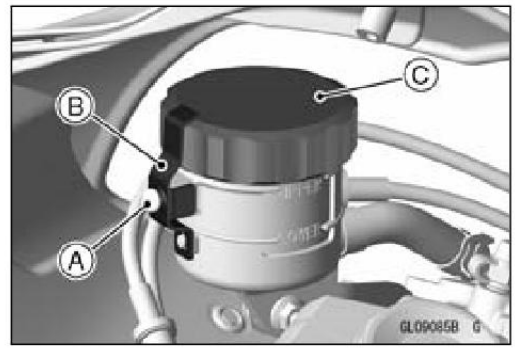
**⚠ WARNING**

**Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.**

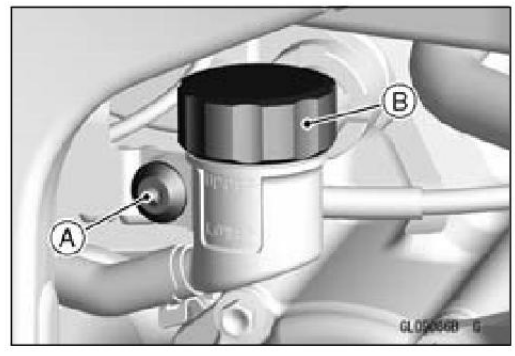
**NOTE**

○ *The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

● Remove:
Screw [A]
Stopper [B]
Front Brake Reservoir Cap [C]



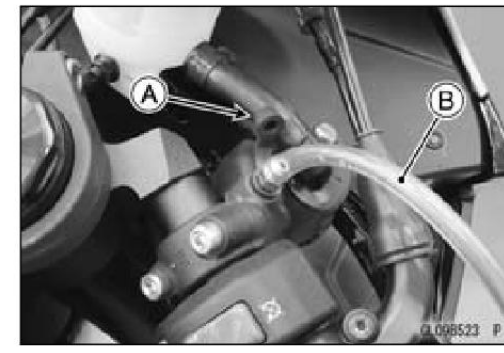

● Remove:
Bolt [A]
Rear Brake Reservoir Cap [B]



## Brake Fluid

- Remove:
  Diaphragm Plate
  Diaphragm
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

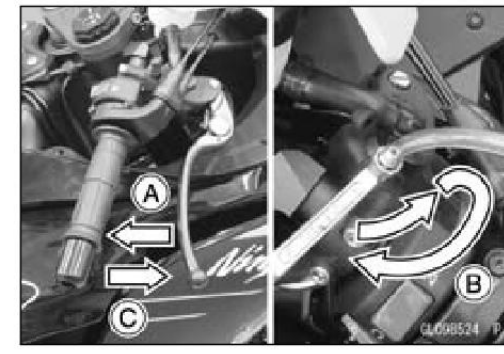
- Remove the rubber cap [A] from the bleed valve on the front master cylinder.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.




- Bleed the brake line and the master cylinder.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].



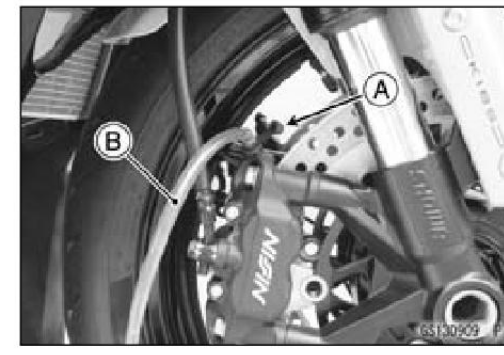

**NOTE**

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

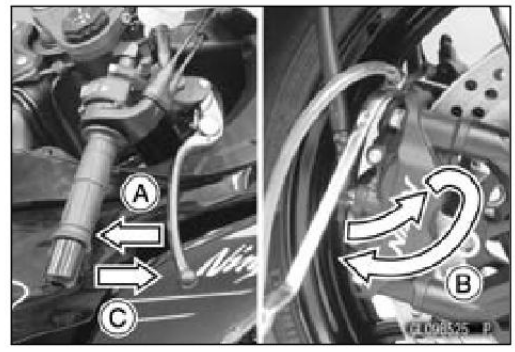
- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

**Torque - Bleed Valve: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



## Brake Fluid




- Bleed the brake line and the caliper.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].

**NOTE**

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

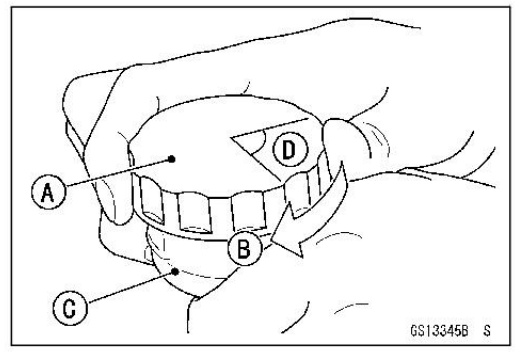
○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

○*Front Brake: First bleeding the right caliper then repeat the above steps for the left caliper.*

- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

**Torque - Bleed Valves: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

- Install:
  Diaphragm
  Diaphragm Plate
  Front Brake Reservoir Cap




- Follow the procedure below to install the front/rear brake fluid reservoir cap correctly.

○First, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.

- Install the stopper and screw.
- Tighten:

**Torque - Front Brake Reservoir Cap Stopper Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)**

- Install the rear brake reservoir, and tighten the bolt.
- Check the fluid level (see Brake Fluid Level Inspection(2-44)).
- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

## Brake Fluid

**⚠ WARNING**

**When working with the disc brake, observe the precautions listed below.**

- **Never reuse old brake fluid.**
- **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
- **Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**
- **Do not leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
- **Do not change the fluid in the rain or when a strong wind is blowing.**
- **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.**
- **When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**
- **Brake fluid quickly damages painted surfaces; any spilled fluid should be completely wiped up immediately.**
- **If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.**

## Brake Hose

### *Brake Hose Removal/Installation*

- Refer to the Brake Hose and Pipe Replacement (see Brake Hose and Pipe Replacement(2-47)).

### *Brake Hose Inspection*

- Refer to the Brake Hose and Pipe Damage and Installation Condition Inspection (see Brake System Inspection(2-43)).

## Anti-Lock Brake System (Equipped Models)

### *ABS Servicing Precautions*

There are a number of important precautions that should be followed servicing the ABS system.

○The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

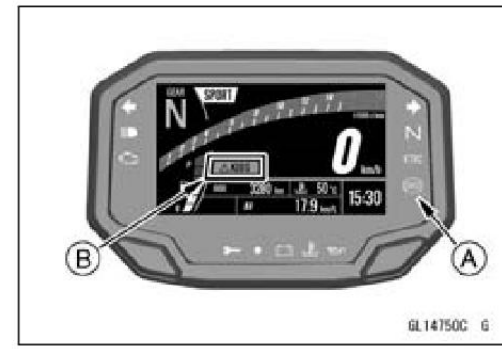
**⚠ WARNING**

**Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.**

***NOTICE***

**Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.**

○The yellow ABS indicator light [A] and KIBS warning message [B] may appear if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If these indicators appear, emedy the problem and clear the service code.



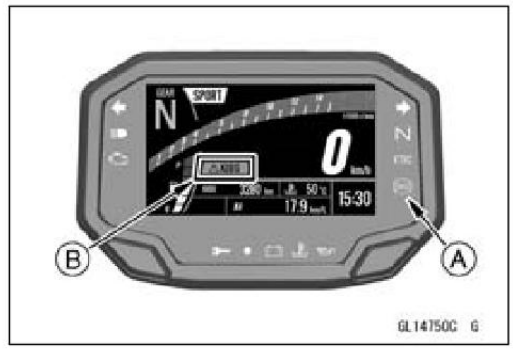

**⚠ WARNING**

**Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.**

○When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.

## Anti-Lock Brake System (Equipped Models)

### *ABS Indicator Light and KIBS Warning Message Inspection*




○In this model, the yellow ABS indicator light [A] and KIBS warning message [B] go on or blink by the data sent from the ABS hydraulic unit.

● Refer to the Meter Unit Inspection (see Meter Unit Inspection(16-67)).

**Yellow ABS Indicator Light and KIBS Warning Message Function**

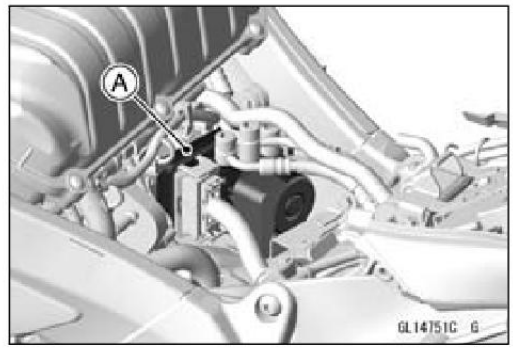
| Status | Brake Condition | (ABS) | △ KIBS |
|---|---|---|---|
| **Normal** | KIBS | Goes off | Non-display |
| **Engine information communication error** | ABS | Goes on | Displays |
| **Battery voltage decreases** | Low voltage ABS* | Blinks | Non-display |
| **ABS error** | Normal brake | Goes on | Non-display |

*: The mode of “Low voltage ABS” controls ABS while reducing the load to the battery.

**NOTE**

○*When the yellow ABS indicator light is blinking, the ABS has been in the low voltage mode (insufficient battery voltage). When it is in the low voltage mode, the KIBS system does not function, but the ABS functions. To recover the KIBS system, charge the battery (see Refreshing Charge(16-29)).*

### *ABS Hydraulic Unit Removal*




***NOTICE***

**The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.**
**Be careful not to get water or mud on the ABS hydraulic unit.**

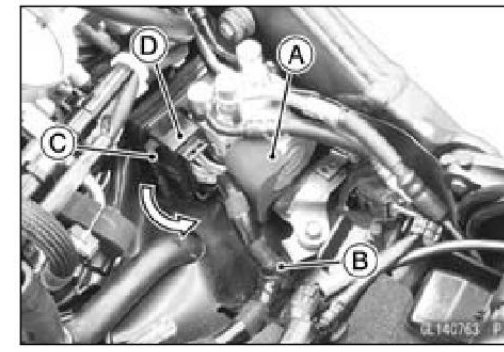
● Drain the brake fluid from the front and rear brake lines.

○Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.

● Remove:
Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))

## Anti-Lock Brake System (Equipped Models)

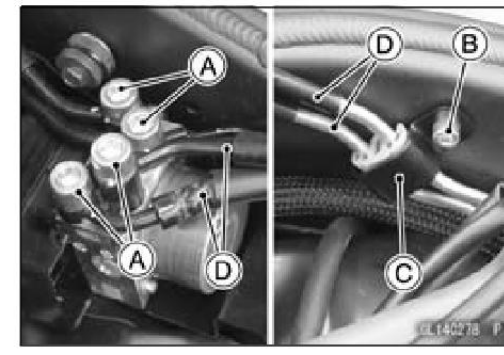
● Clean the ABS hydraulic unit.




| NOTICE |
| --- |
| **Clean all fittings on the ABS hydraulic unit and the rear master cylinder because dirt around the banjo bolts could contaminate the brake fluid in the line during removal/installation.**<br>**Spread over a shop towel around the ABS hydraulic unit before removing the brake line so that brake fluid does not leak on the parts.** |

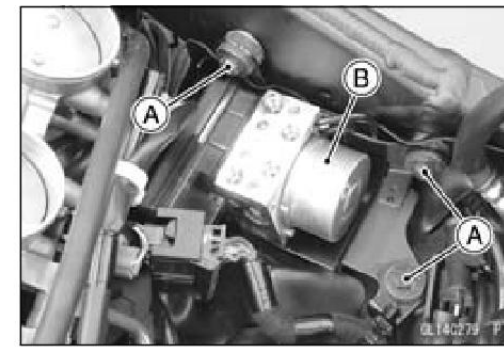
● Remove the pad [A].
● Pull out the clamp [B] from the bracket.
● Pull the lever [C] backward to disconnect the ABS hydraulic unit connector [D].

● Remove:
Brake Pipe Banjo Bolts [A] and washer
Bolt [B]
Clamp [C]
● Disconnect the brake pipes [D] from the ABS hydraulic unit and move it aside.

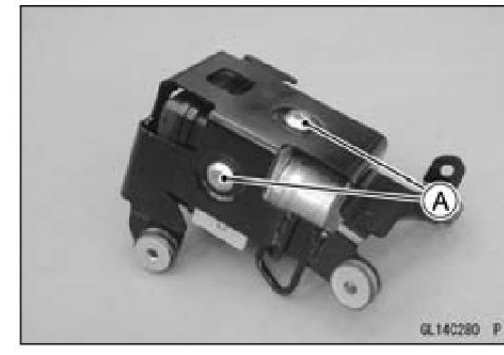



| NOTICE |
| --- |
| **Be careful not to bend the metal pipe portion of the brake pipes.**<br>**Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |

● Remove the bolts [A].
● Remove the ABS hydraulic unit [B] together with the bracket.
○Clear the ABS hydraulic unit bracket from the rubber cover.




● Remove the bolts [A] and ABS hydraulic unit bracket.




| NOTICE |
| --- |
| **The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.** |

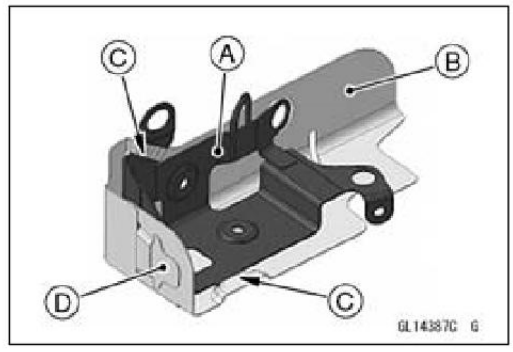
### *ABS Hydraulic Unit Installation*

| NOTICE |
| --- |
| **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.** |

## Anti-Lock Brake System (Equipped Models)

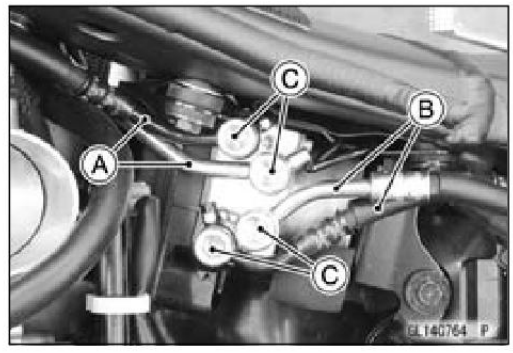
- Install the ABS hydraulic unit to the bracket [A].
- Wrap the ABS hydraulic unit bracket with the rubber cover [B] as shown.

○Insert the bracket into the slits [C] of the rubber cover and the tab [D] through the two slits of the rubber cover.
○In this graphic, the ABS hydraulic unit has been eraced for clearity.

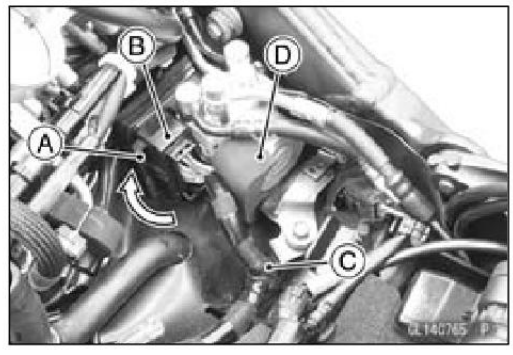



- Install the ABS hydraulic unit together with the bracket, and tighten the bolts.
- Replace the washers that are on each side of pipe fitting with new ones.
- Connect the front brake pipes [A] and rear brake pipes [B] with the washers (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

**Torque - Brake Pipe Banjo Bolts [C]: 23 N·m (2.3 kgf·m, 17 ft·lb)**




- Push the lever [A] forward to connect the ABS hydraulic unit connector [B].
- Install the clamp [C] into the bracket.
- Install the pad [D] so that its recess fit with the bolt on the hydraulic unit.
- Bleed the brake line (see Brake Line Bleeding(12-24)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the fuel tank (see Fuel Tank Installation(3-40)).



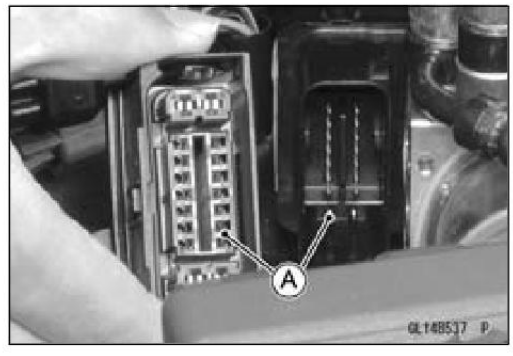

### *ABS Hydraulic Unit Inspection*

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal(12-30)).
- Visually inspect the connector terminals [A].

★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.
★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.

- Visually inspect the ABS hydraulic unit.

★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.



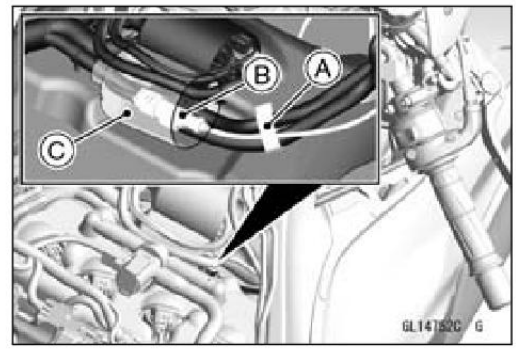

### *Front Wheel Rotation Sensor Removal*

| *NOTICE* |
| --- |
| **The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.**<br>**Do not try to disassemble or repair the wheel rotation sensor.** |

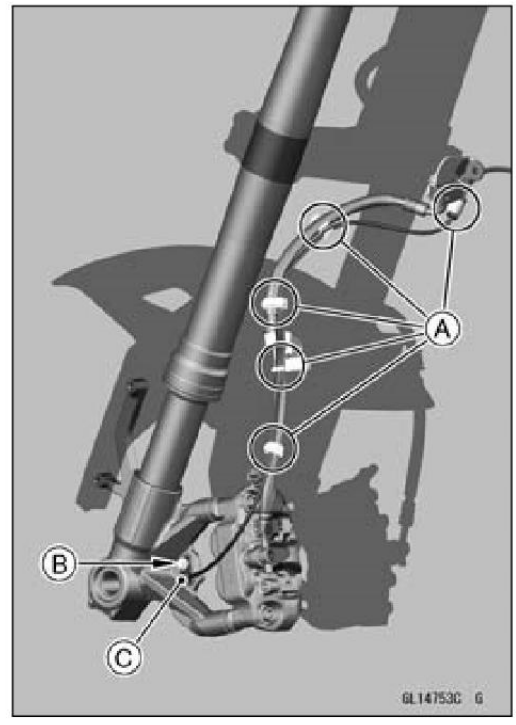
## Anti-Lock Brake System (Equipped Models)

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Open the clamp [A].
- Disconnect the front wheel rotation sensor connector [B].

○There is the connector in the dust cover [C].




- Clear the sensor lead from the clamps [A].
- Remove:
  Wheel Rotation Sensor Bolt [B]
  Front Wheel Rotation Sensor [C]




### *Front Wheel Rotation Sensor Installation*

- Installation is the reverse of removal.
- When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).

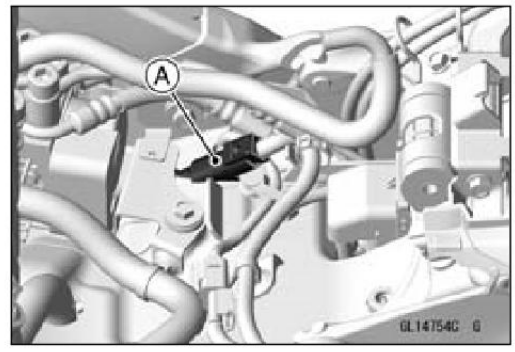
**Torque - Wheel Rotation Sensor Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

### *Rear Wheel Rotation Sensor Removal*

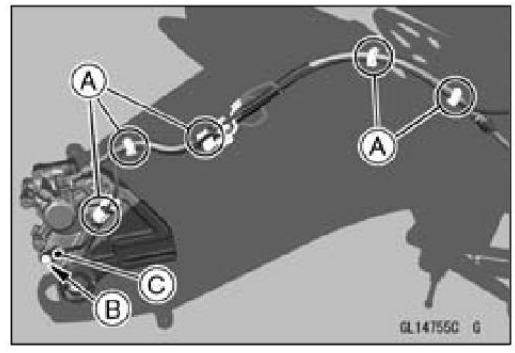
| *NOTICE* |
| --- |
| **The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.**<br>**Do not try to disassemble or repair the wheel rotation sensor.** |

## Anti-Lock Brake System (Equipped Models)

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect the rear wheel rotation sensor connector [A].




- Clear the sensor lead from the clamps [A].
- Remove:
  Wheel Rotation Sensor Bolt [B]
  Rear Wheel Rotation Sensor [C]




### *Rear Wheel Rotation Sensor Installation*

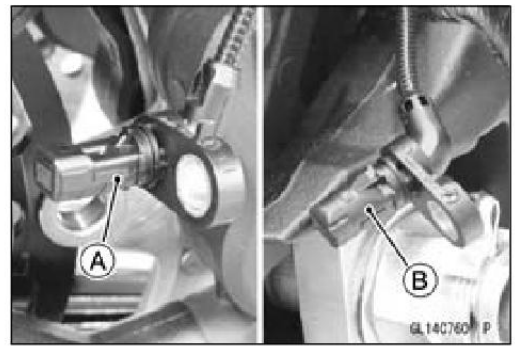
- Installation is the reverse of removal.
- When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).

**Torque - Wheel Rotation Sensor Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)**

### *Wheel Rotation Sensor Inspection*

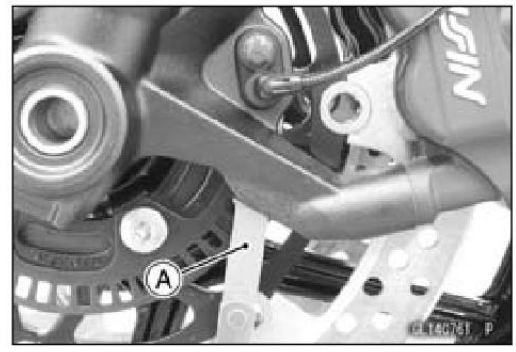
- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.

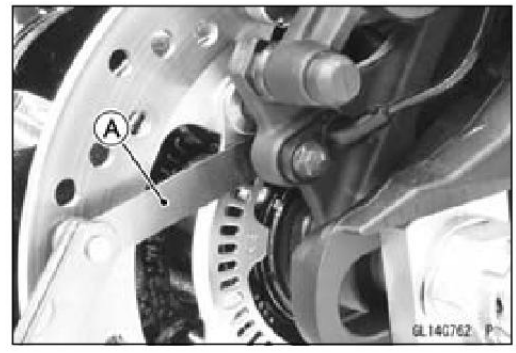
★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.



## Anti-Lock Brake System (Equipped Models)

### *Wheel Rotation Sensor Air Gap Inspection*




- Raise the front/rear wheel off the ground (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Measure the air gap between the sensor and sensor rotor at several points by turning the wheel slowly.
  Thickness Gauge [A]

**Wheel Rotation Sensor Air Gap**
**Standard:**

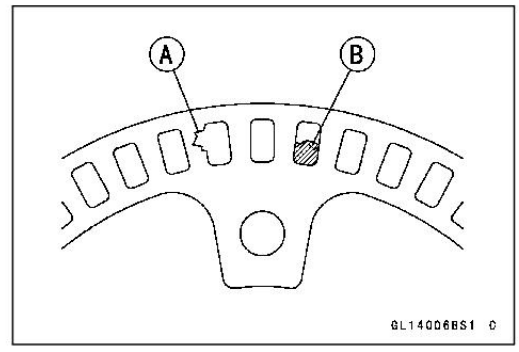
| | |
|---|---|
| **Front** | **0.60 – 1.33 mm (0.02 – 0.05 in.)** |
| **Rear** | **0.65 – 1.28 mm (0.03 – 0.05 in.)** |

**NOTE**

○ *The sensor air gap cannot be adjusted.*

★ If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection(10-17)), sensor installation condition and sensor (see Wheel Rotation Sensor Inspection(12-34)).

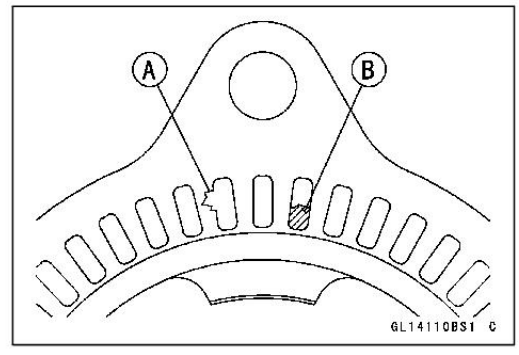
### *Wheel Rotation Sensor Rotor Inspection*




- Visually inspect the wheel rotation sensor rotor.

★ If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.

★ If there is iron or other magnetic deposits [B], remove the deposits.




### *ABS Solenoid Valve Relay Fuse (15 A) Removal*

- Refer to the Fuse Box Fuse Removal (see Fuse Box Fuse Removal(16-105)).

### *ABS Motor Relay Fuse (25 A) Removal*

- Refer to the Fuse Box Fuse Removal (see Fuse Box Fuse Removal(16-105)).

### *Fuse Installation*

- If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage (see Fuse Installation(16-106)).

## Anti-Lock Brake System (Equipped Models)

### *Fuse Inspection*

- Remove the fuses (see ABS Solenoid Valve Relay Fuse (15 A) Removal(12-35)) (see ABS Motor Relay Fuse (25 A) Removal(12-35)).
- Refer to the Fuse Inspection (see Fuse Inspection(16-106)).

# Suspension

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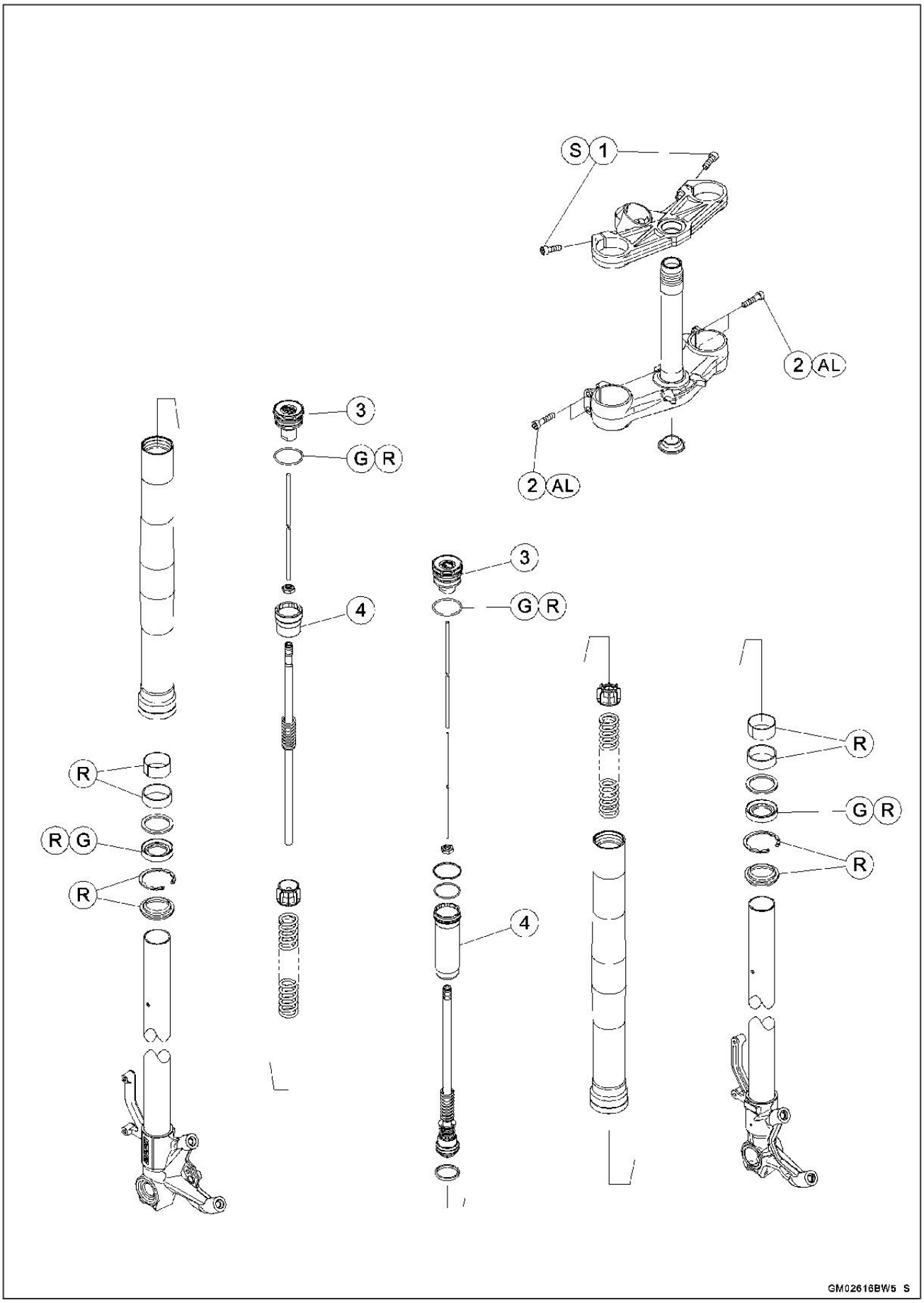
## Exploded View

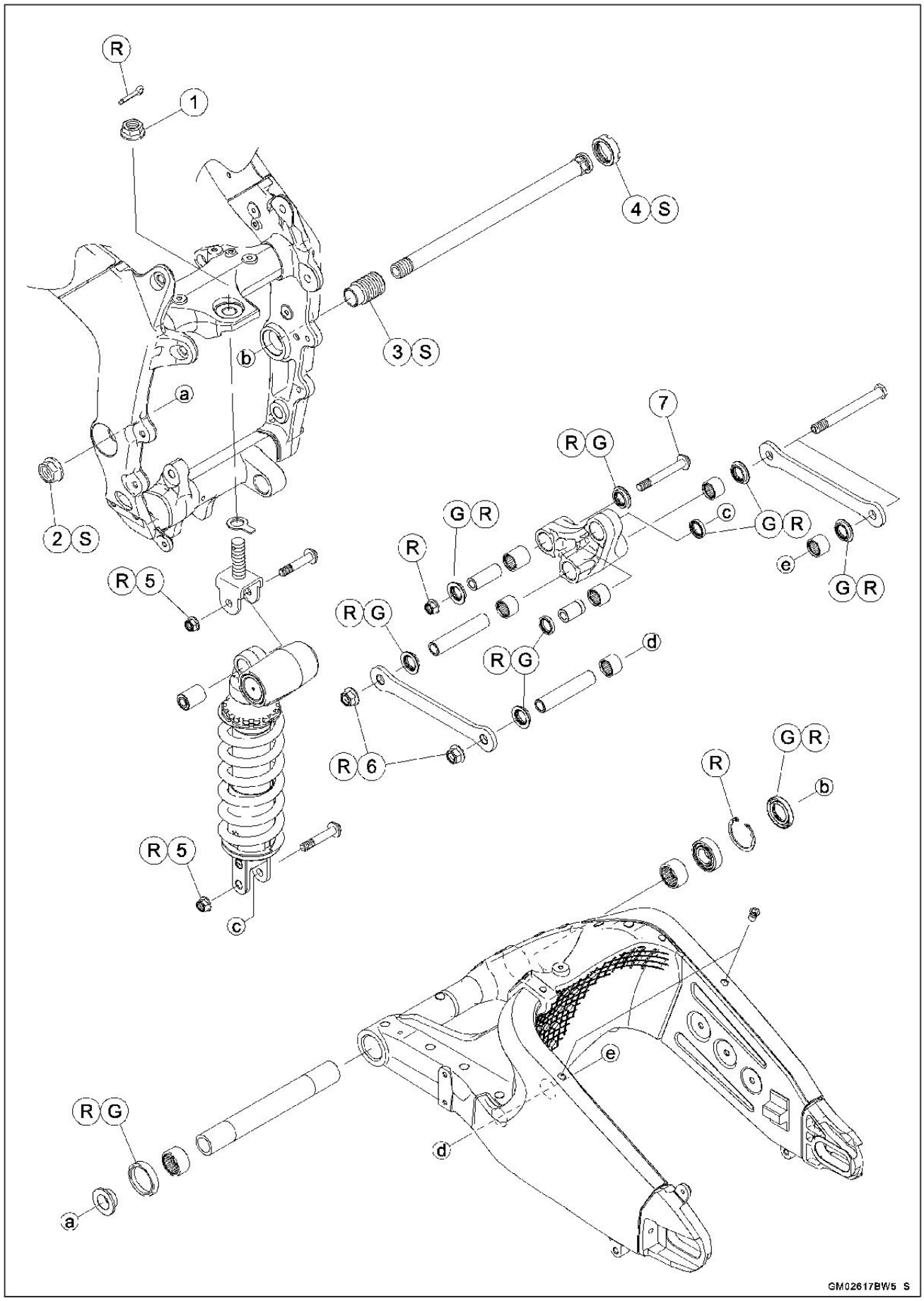


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Front Fork Clamp Bolts (Upper) | 20 | 2.0 | 15 | S |
| 2 | Front Fork Clamp Bolts (Lower) | 25 | 2.5 | 18 | AL |
| 3 | Front Fork Top Plugs | 35 | 3.6 | 26 | |
| 4 | Piston Rod Guide Case | 90 | 9.2 | 66 | |

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts

## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Rear Shock Absorber Bracket Nut | 60 | 6.1 | 44 | |
| 2 | Swingarm Pivot Shaft Nut | 110 | 11.2 | 81.1 | S |
| 3 | Swingarm Pivot Adjusting Collar | 20 | 2.0 | 15 | S |
| 4 | Swingarm Pivot Adjusting Collar Locknut | 100 | 10.2 | 73.8 | S |
| 5 | Rear Shock Absorber Nuts | 35 | 3.6 | 26 | R |
| 6 | Tie-Rod Nuts | 60 | 6.1 | 44 | R |
| 7 | Rocker Arm Bolt | 35 | 3.6 | 26 | |

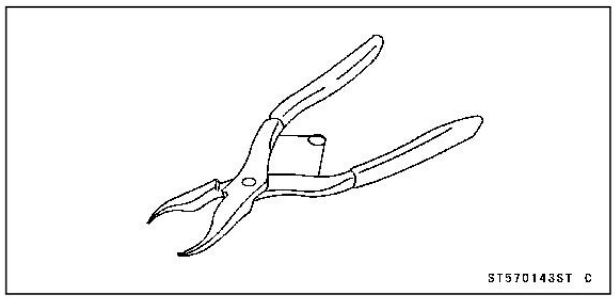
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

## Specifications

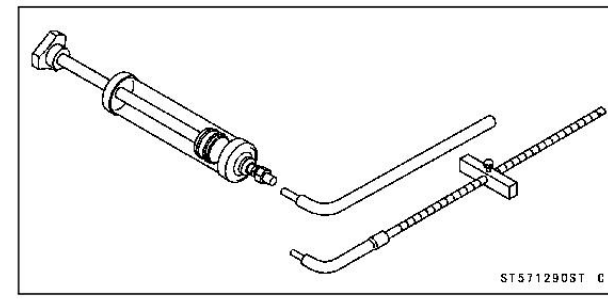
| Item | Standard |
|---|---|
| **Front Fork (Per One Unit)** | |
| Fork Inner Tube Diameter | $\phi$41 mm (1.6 in.) |
| Air Pressure | Atmospheric pressure (non-adjustable) |
| Rebound Damper Setting | 4 1/4 turns out from the fully clockwise position |
| | (Usable Range: 0←→5 1/2 turns out) |
| Compression Damper Setting | 6 turns out from the fully clockwise position |
| | (Usable Range: 0←→7 turns out) |
| Fork Spring Preload Setting | 5 turns in from the fully counterclockwise position |
| | (Usable Range: 0←→20 turns in) |
| Suspension Oil | Kawasaki SS-47 or equivalent |
| Amount: | |
| Right Front Fork: | |
| When Changing Oil | Approx. 455 mL (15.4 US oz.) |
| After Disassembly and Completely Dry | 535 ±2.5 mL (18.1 ±0.08 US oz.) |
| Left Front Fork: | |
| When Changing Oil | Approx. 480 mL (16.2 US oz.) |
| After Disassembly and Completely Dry | 564 ±2.5 mL (19.1 ±0.08 US oz.) |
| Fork Oil Level: | |
| Right Front Fork | 93 ±2 mm (3.7 ±0.08 in.) (fully compressed, below from the top of the inner tube) |
| Left Front Fork | 82 ±2 mm (3.2 ±0.08 in.) (fully compressed, below from the top of the inner tube) |
| Fork Spring Free Length | 306 mm (12.0 in.) |
| | (Service Limit: 300 mm (11.8 in.)) |
| **Rear Shock Absorber** | |
| Rebound Damper Setting | 1 1/2 turns out from the fully clockwise position |
| | (Usable Range: 0←→3 turns out) |
| Compression Damper Setting | 2 1/2 turns out from the fully clockwise position |
| | (Usable Range: 0←→5 turns out) |
| Spring Preload Setting (Spring length) | 205 mm (8.07 in.) |
| | (Usable Range: 199 – 209 mm (7.83 – 8.23 in.)) |
| Gas Pressure | 980 – 1 280 kPa (10.00 – 13.06 kgf/cm², 142.1 – 185.6 psi, non-adjustable) |

## Special Tools

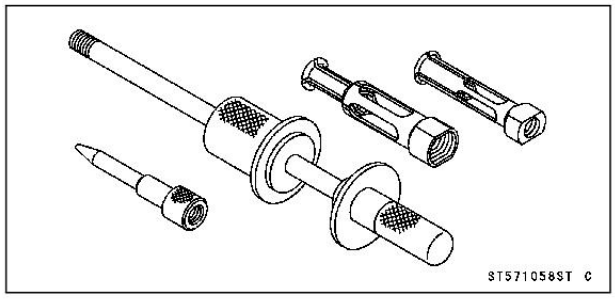
**Inside Circlip Pliers:**
**57001-143**



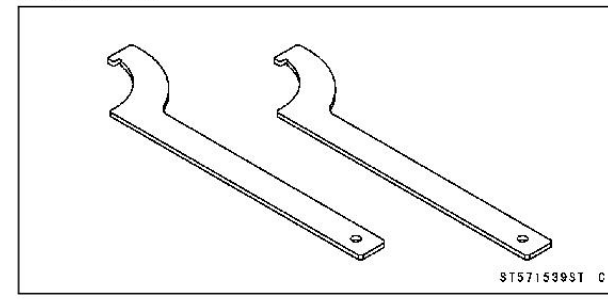

**Fork Oil Level Gauge:**
**57001-1290**



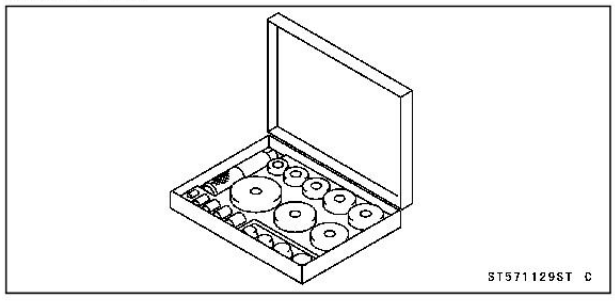

**Oil Seal & Bearing Remover:**
**57001-1058**



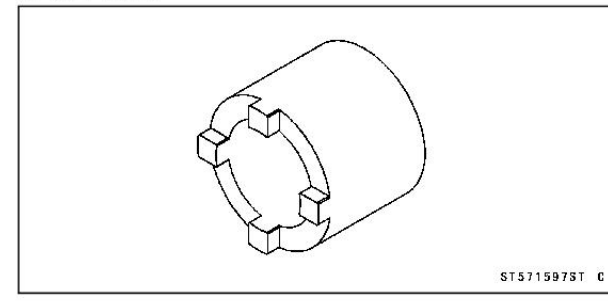

**Hook Wrench T=3.2 R37:**
**57001-1539**



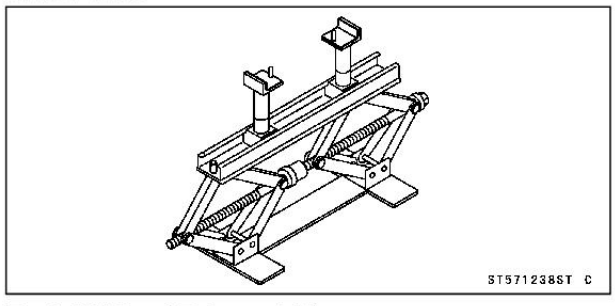

**Bearing Driver Set:**
**57001-1129**



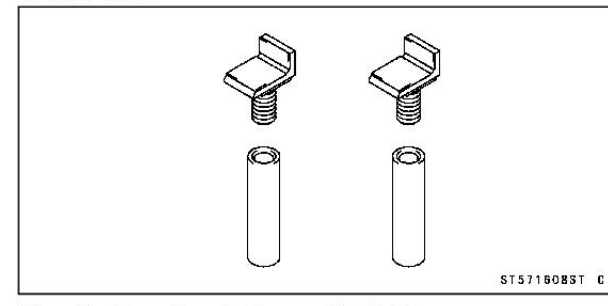

**Swingarm Pivot Nut Wrench:**
**57001-1597**



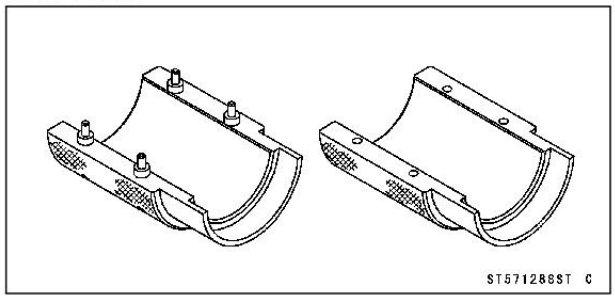

**Jack:**
**57001-1238**



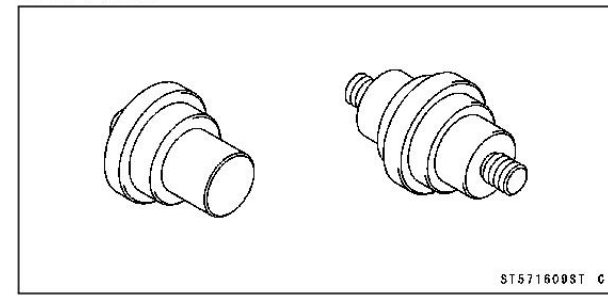

**Jack Attachment:**
**57001-1608**




**Fork Oil Seal Driver, $\phi$41:**
**57001-1288**

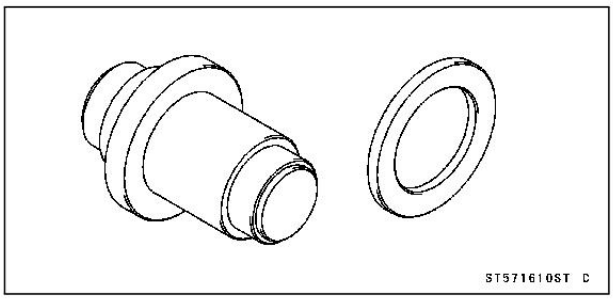



**Needle Bearing Driver, $\phi$17/$\phi$18:**
**57001-1609**

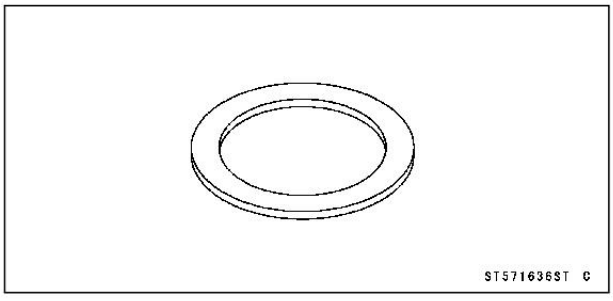


## Special Tools

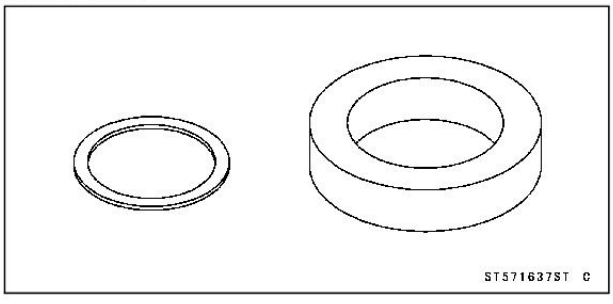
**Needle Bearing Driver, $\phi$28:**
**57001-1610**



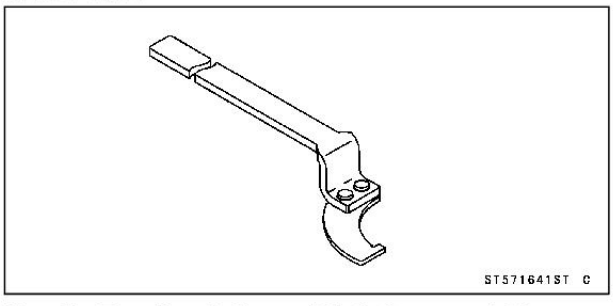

**Spacer, $\phi$18:**
**57001-1636**



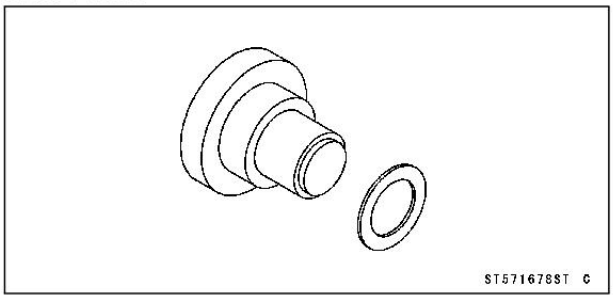

**Spacer, $\phi$28:**
**57001-1637**



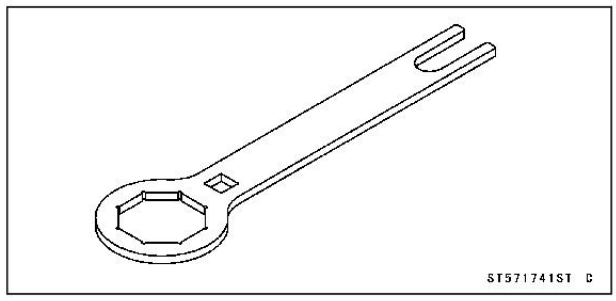

**Hook Wrench:**
**57001-1641**



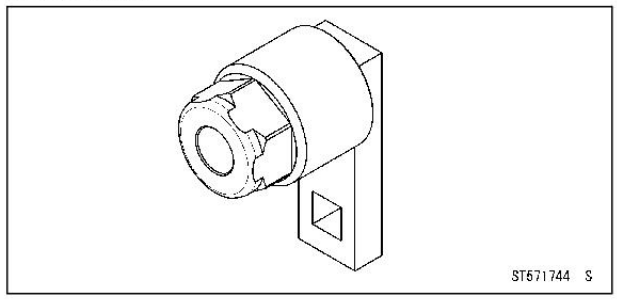

**Needle Bearing Driver, $\phi$20 & Spacer, $\phi$28:**
**57001-1678**



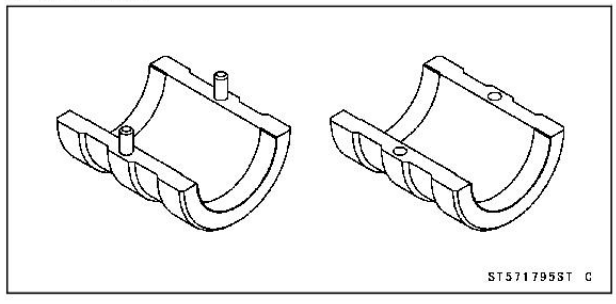

**Top Plug Wrench (45 mm):**
**57001-1741**



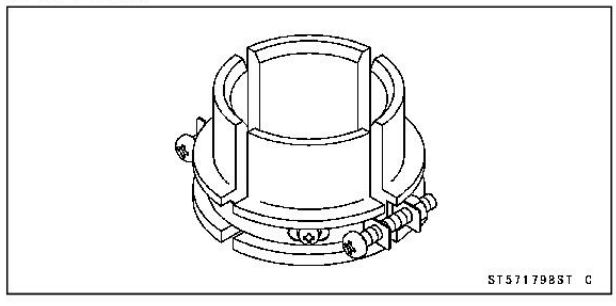

**Rod Guide Case Wrench, 33 mm:**
**57001-1744**




**Fork Oil Seal Driver Weight, $\phi$26 – $\phi$46:**
**57001-1795**

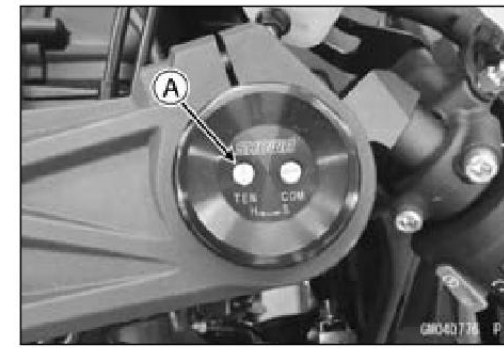



**Fork Oil Seal Driver Attachment, $\phi$36 – $\phi$46:**
**57001-1798**



## Front Fork

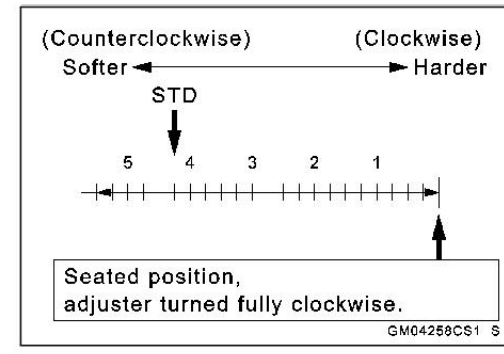
### *Rebound Damping Force Adjustment*




- To adjust the rebound damping force, turn the rebound damping adjuster [A].

○The standard adjuster setting is the **4 1/4 turns out** from the fully clockwise position.

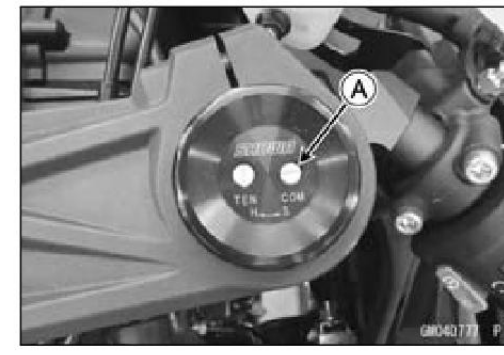
○The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.




**Rebound Damping Force Adjustment**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 5 1/2 turns out | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 0 | Strong | Hard | Heavy | Bad | High |

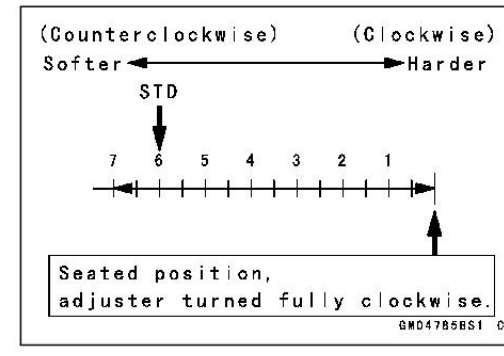
### *Compression Damping Force Adjustment*




- To adjust the compression damping force, turn the compression damping adjuster [A].

○The standard adjuster setting is the **6 turns out** from the fully clockwise position.

○The damping force can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the damping feels too soft or too stiff, adjust it in accordance with the following table.

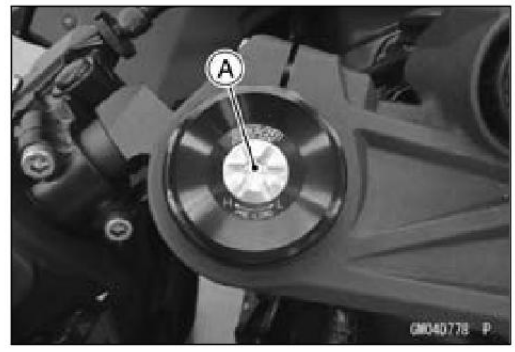



**Compression Damping Force Adjustment**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 7 turns out | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 0 | Strong | Hard | Heavy | Bad | High |

## Front Fork

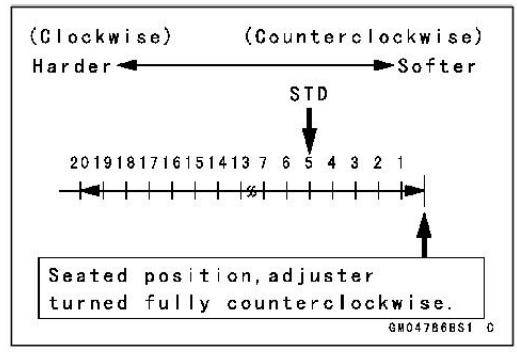
### *Spring Preload Adjustment*




- To adjust the spring preload, turn the spring preload adjuster [A].

○The standard adjuster setting is the **5 turns in** from the fully counterclockwise position.

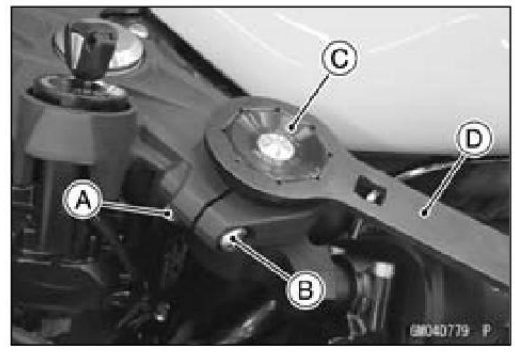
○The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.




**Spring Action**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 0 | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 20 turns in | Strong | Hard | Heavy | Bad | High |

### *Front Fork Removal (Each Fork Leg)*




- Remove:
  Front Wheel (see Front Wheel Removal(10-6))
  Front Fender (see Front Fender Removal(15-24))
  Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
  Lower Inner Fairing (see Lower Inner Fairing Removal(15-10))
- Loosen:
  Handlebar Clamp Bolt [A]
  Front Fork Clamp Bolt (Upper) [B]

★Loosen the front fork top plug [C] beforehand if the fork leg is to be disassembled.

○Place a plastic bag over the top plug to protect the top plug.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741 [D]**

**NOTE**

○*Loosen the top plug after loosening the handlebar clamp bolt and front fork clamp bolt (upper).*

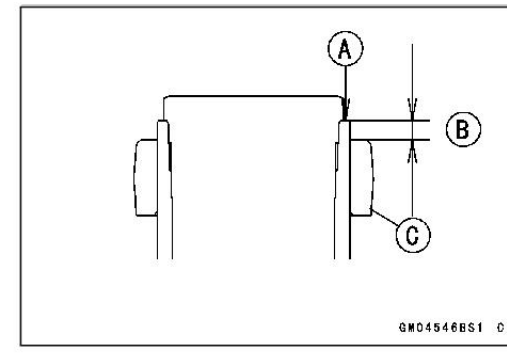
## Front Fork

● Loosen:
Front Fork Clamp Bolts (Lower) [A]
● With a twisting motion, remove the fork leg down and out.

### *Front Fork Installation (Each Fork Leg)*

● Install the fork so that the top end [A] of the outer tube as shown.
8 mm (0.31 in.) [B]
Steering Stem Head [C]
● Tighten:

**Torque - Front Fork Clamp Bolts (Lower): 25 N·m (2.5 kgf·m, 18 ft·lb)**




**NOTE**

○*Tighten the two front fork clamp bolts (lower) alternately two times to ensure even tightening torque.*

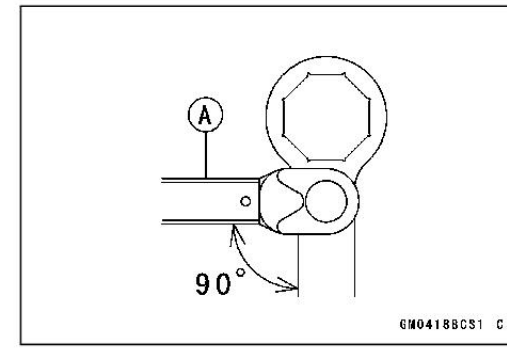
● Tighten:
○Place a plastic bag over the top plug to protect the top plug.

**Torque - Front Fork Top Plugs: 35 N·m (3.6 kgf·m, 26 ft·lb)**

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**

**NOTE**

○*Tighten the front fork top plug before tightening the handlebar clamp bolt and front fork clamp bolt (upper).*
○*To obtain the correct tightening torque with your torque wrench [A], install it to the special tool as shown.*




● Tighten:

**Torque - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)**
**Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

● Install the removed parts.
● Adjust:
Spring Preload (see Spring Preload Adjustment(13-10))
Rebound Damping Force (see Rebound Damping Force Adjustment(13-9))
Compression Damping Force (see Compression Damping Force Adjustment(13-9))

## Front Fork

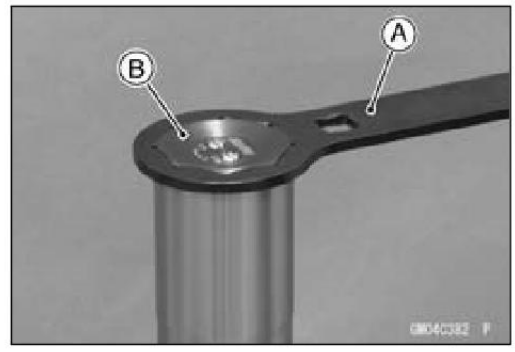
### *Front Fork Oil Change*

**Right Front Fork**

- Remove the front fork (see Front Fork Removal (Each Fork Leg)(13-10)).
- Hold the inner tube lower end in a vise.
- Using the wrench [A], remove the top plug [B] out of the outer tube.

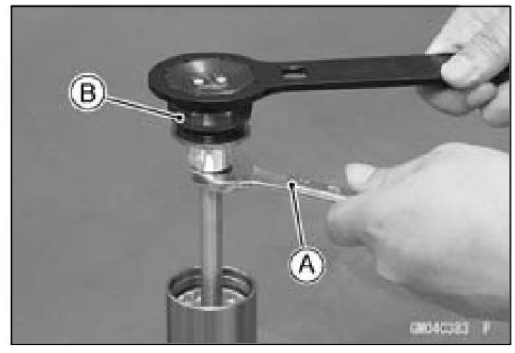
○Place a plastic bag over the top plug to protect the top plug.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**

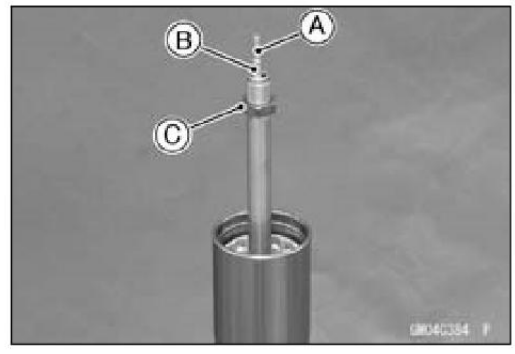



- Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**

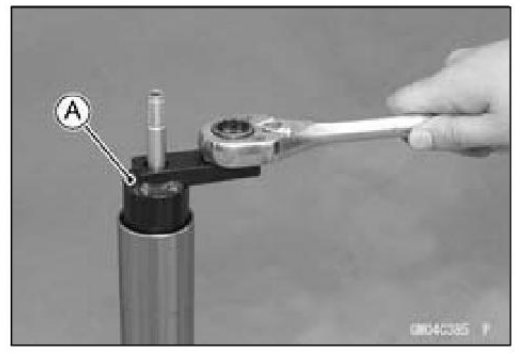



- Remove:
  Rebound Damping Adjuster Rod (Inside) [A]
  Compression Damping Adjuster Rod (Outside) [B]
  Piston Rod Nut [C]




- Using the rod guide case wrench [A], remove the piston rod guide case from the inner tube.

**Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744**

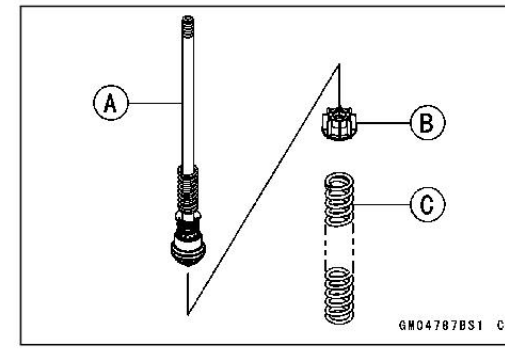



***NOTICE***

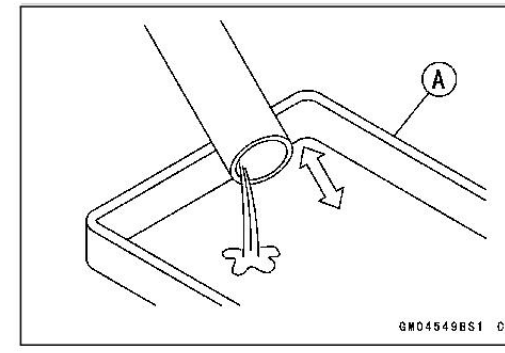
**A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.**
**When loosening the piston rod guide case, if the wrench is not securely seated on it, the piston rod guide case may break.**

## Front Fork

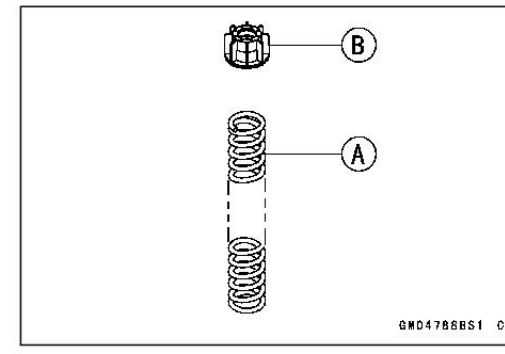
● Remove:
Piston Rod Assy [A]
Collar [B]
Fork Spring [C]




● Drain the fork oil into a suitable container [A].
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.

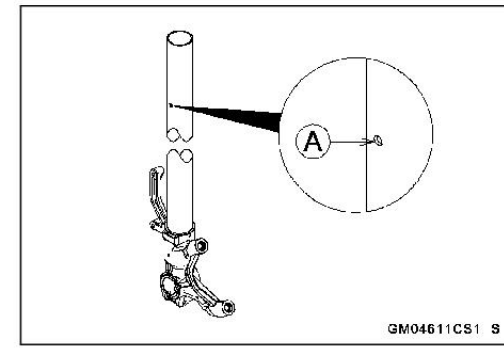



● Install:
Fork Spring [A]
● Install the collar [B] so that the large diameter side faces downward.




● Hold the fork tube upright, press the outer tube.
● Pour in the type and amount of fork oil specified.
○Pour the fork oil until the upper of the inner tube hole [A].

**Suspension Oil - SS-47 (1 L): 44091-0010**
**Amount:**
**When changing oil:**
**Approx. 455 mL (15.4 US oz.)**
**After disassembly and completely dry:**
**535 ±2.5 mL (18.1 ±0.08 US oz.)**




● Move the inner tube up and down more than 10 times in order to expel the air from the fork oil.

● Install the piston rod assy and piston rod guide case into the inner tube.

**NOTE**

○*Lifting the outer tube, and install the piston rod guide case.*

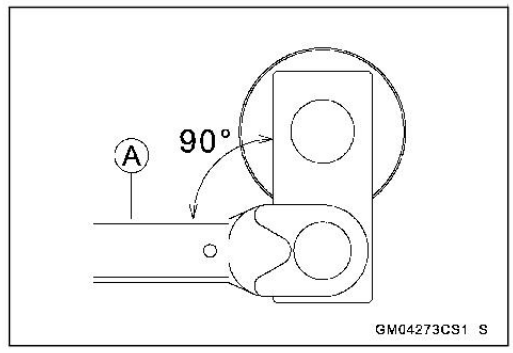
| ***NOTICE*** |
| --- |
| **When inserting, be careful not to damage the piston ring [A].** |

## Front Fork

- Hold the inner tube bottom by a vise.
- Using rod guide case wrench, tighten the piston rod guide case to the inner tube.

**Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744**

**Torque - Piston Rod Guide Case: 90 N·m (9.2 kgf·m, 66 ft·lb)**



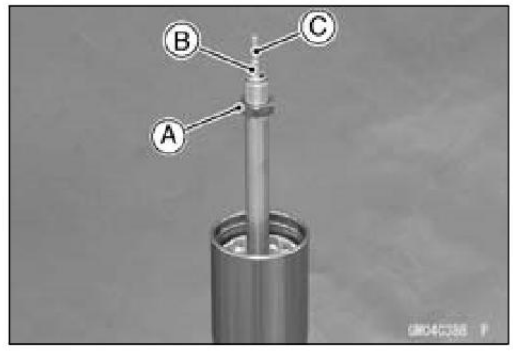

**NOTE**

○*To obtain the correct tightening torque with your torque wrench [A], install the special tool as shown.*

***NOTICE***

**A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.**
**When tightening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.**

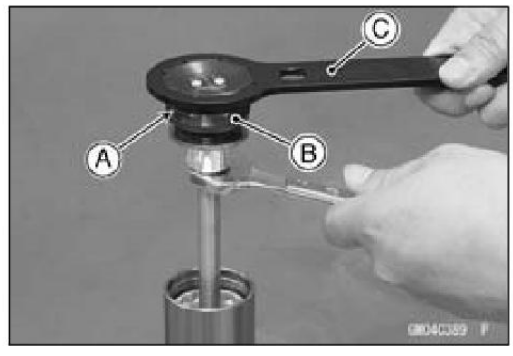
- Install the piston rod nut [A] until it is bottomed.
- Install:
  Compression Damping Adjuster Rod (Outside) [B]
  Rebound Damping Adjuster Rod (Inside) [C]



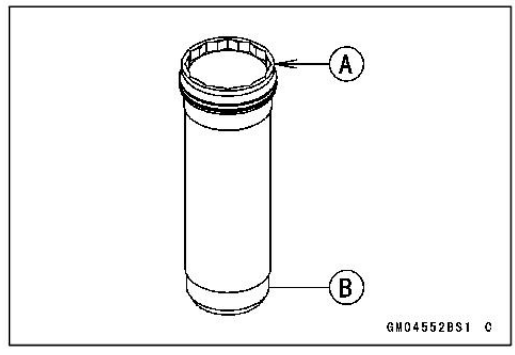

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Install the top plug [B] to the piston rod.
- Holding the top plug with a wrench [C], tighten the piston rod nut against the top plug.

○Place the plastic bag over the top plug.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**



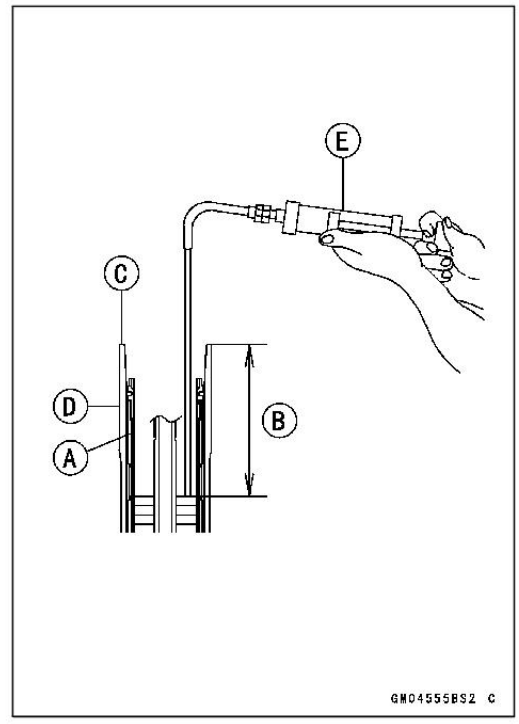

- Pour the fork oil of the remainder until the upper [A] of the piston rod guide case [B].
- Move the piston rod assy up and down more than 10 times in order to expel all the air from the fork oil.
- Move the outer tube up and down more than 10 times in order to expel all the air from the fork oil.



## Front Fork

● Measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Wait until the oil level settles.
○With the fork fully compressed, insert a tape measure or rod into the piston rod guide case [A], and measure the distance [B] from the top [C] of the outer tube [D] to the oil.

**Oil Level (fully compressed)**
**Standard: 93 ±2 mm (3.7 ±0.08 in.)**




**NOTE**

○*Fork oil level may also be measured using the fork oil level gauge [E].*

**Special Tool - Fork Oil Level Gauge: 57001-1290**

○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.

● Lift the outer tube.
● Using the wrench, tighten the top plug temporary.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**

● Install the front fork (see Front Fork Installation (Each Fork Leg)(13-11)).

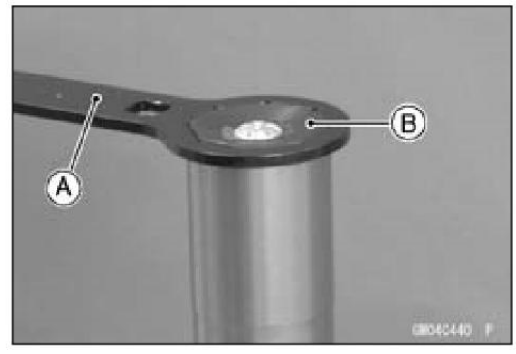
**NOTE**

○*After installing the front fork, adjust the damping force correctly.*

### Left Front Fork

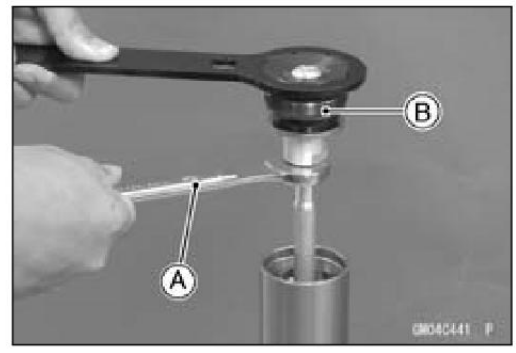
● Remove the front fork (see Front Fork Removal (Each Fork Leg)(13-10)).
● Turn the spring preload adjuster fully counterclockwise for removing the piston rod assy easily.
● Hold the inner tube lower end in a vise.
● Using the wrench [A], remove the top plug [B] out of the outer tube.
○Place a plastic bag over the top plug to protect the top plug.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**



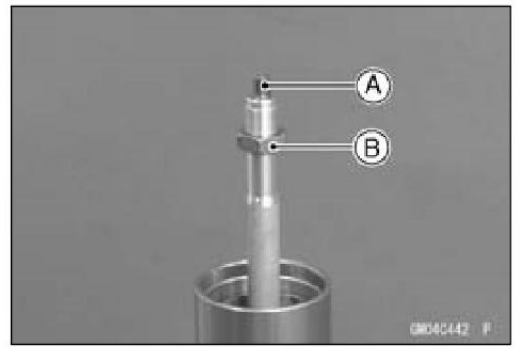

● Holding the piston rod nut with a wrench [A], remove the top plug [B] from the piston rod.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**



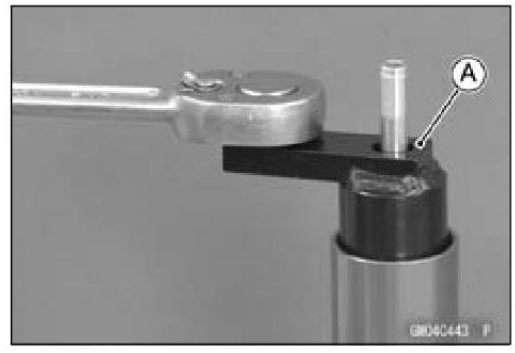
## Front Fork

● Remove:
Spring Preload Adjuster Rod [A]
Piston Rod Nut [B]




● Using the rod guide case wrench [A], remove the piston rod guide case from the inner tube.

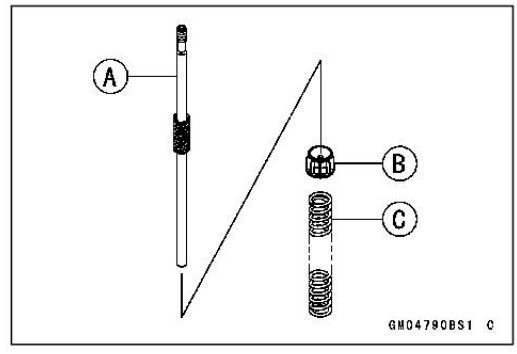
**Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744**



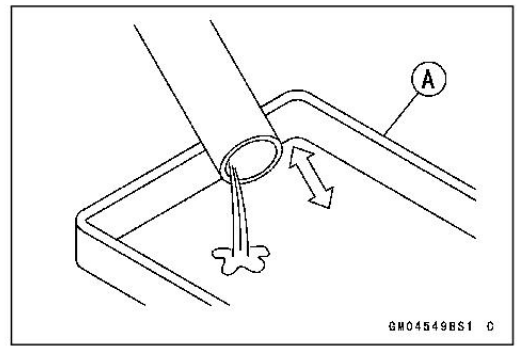

***NOTICE***

**A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.**
**When loosening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.**

● Remove:
Piston Rod [A]
Collar [B]
Fork Spring [C]

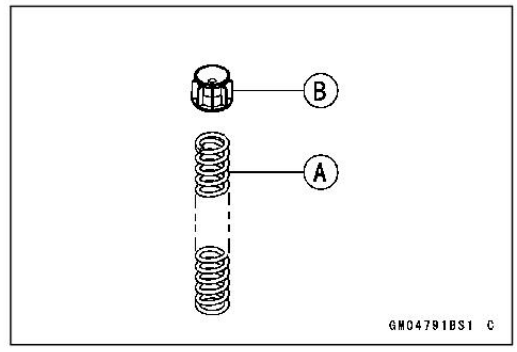



● Drain the fork oil into a suitable container [A].
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.



## Front Fork

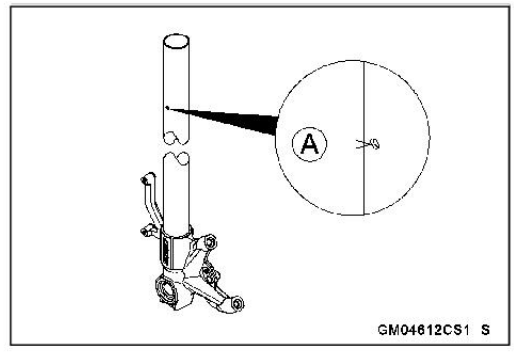
- Install:
  Fork Spring [A]
- Install the collar [B] so that the large diameter side faces downward.




- Hold the fork tube upright, press the outer tube.
- Pour in the type and amount of fork oil specified.

○Pour the fork oil until the upper of the inner tube hole [A].

**Suspension Oil - SS-47 (1 L): 44091-0010**
**Amount:**
**When changing oil:**
**Approx. 480 mL (16.2 US oz.)**
**After disassembly and completely dry (Total):**
**564 ±2.5 mL (19.1 ±0.08 US oz.)**

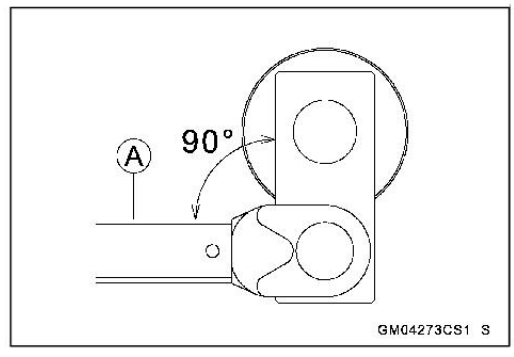



- Move the inner tube up and down more than 10 times in order to expel the air from the fork oil.

- Insert the piston rod into the inner tube.
- Hold the inner tube bottom by a vise.
- Using rod guide case wrench, tighten the piston rod guide case to the inner tube.

**Special Tool - Rod Guide Case Wrench, 33 mm: 57001 -1744**

**Torque - Piston Rod Guide Case: 90 N·m (9.2 kgf·m, 66 ft·lb)**




### NOTE

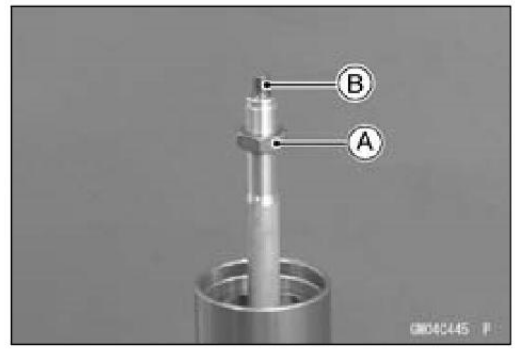
○*To obtain the correct tightening torque with your torque wrench [A], install the special tool as shown.*

### *NOTICE*

**A socket of piston rod guide case is shallow (4 mm) and therefore be sure to check that the wrench (Special Tool: 57001-1744) is securely seated on the piston rod guide case.**
**When tightening the piston rod guide case. If the wrench is not securely seated on it, the piston rod guide case may brake.**

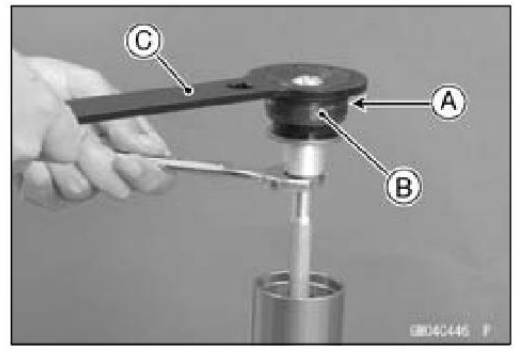
## Front Fork

● Install the piston rod nut [A] until it is bottomed.
● Install:
Spring Preload Adjuster Rod [B]

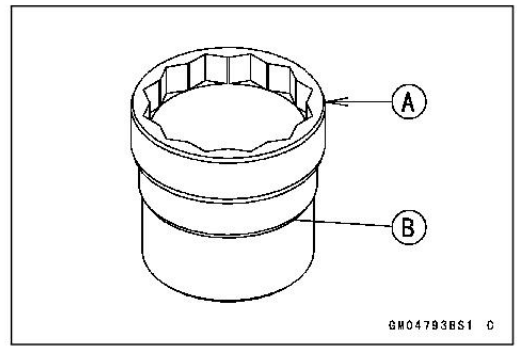



● Replace the O-ring [A] with a new one.
● Apply grease to the new O-ring.
● Install the top plug [B] to the piston rod.
● Holding the top plug with the wrench [C], tighten the piston rod nut against the top plug.
○Place a plastic bag over the top plug.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**




● Pour the fork oil of the remainder until the upper [A] of the piston rod guide case [B].
● Move the piston rod assembly up and down more than 10 times in order to expel all the air from the fork oil.
● Move the outer tube up and down more than 10 times in order to expel all the air from the fork oil.




● Measure the oil level as follows.
○Hold the inner tube vertically in a vise.
○Wait until the oil level settles.
○With the fork fully compressed, insert a tape measure or rod into the piston rod guide case [A], and measure the distance [B] from the top [C] of the outer tube [D] to the oil.

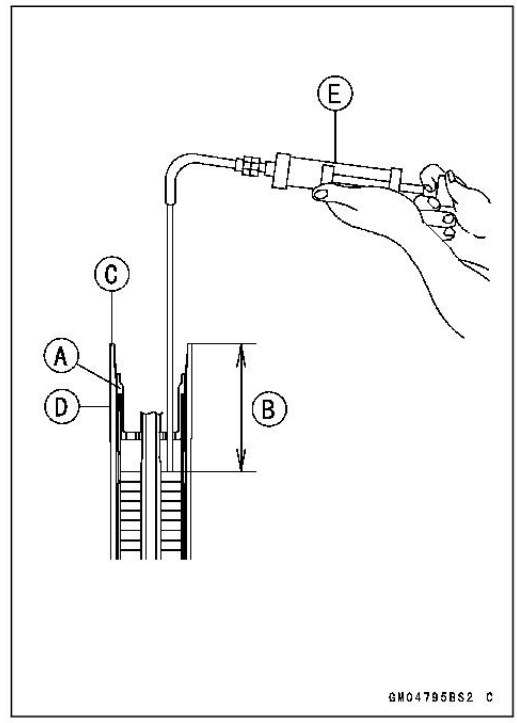
**Fork Oil Level (fully compressed)**
**Standard: 82 ±2 mm (3.2 ±0.08 in.)**

**NOTE**

○*Fork oil level may also be measured using the fork oil level gauge [E].*

**Special Tool - Fork Oil Level Gauge: 57001-1290**

○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.
★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



## Front Fork

- Lift the outer tube.
- Using the wrench, tighten the top plug temporary.

**Special Tool - Top Plug Wrench (45 mm): 57001-1741**

- Install the front fork (see Front Fork Installation (Each Fork Leg)(13-11)).

**NOTE**

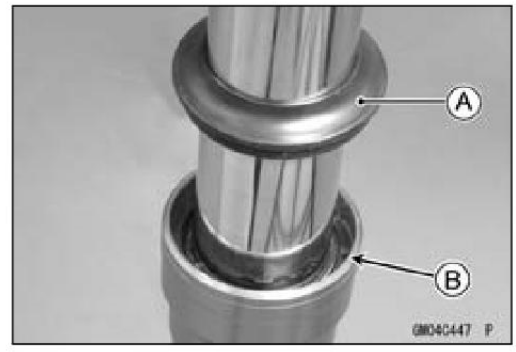
○*After installing the front fork, adjust the spring preload correctly.*

### *Front Fork Disassembly*

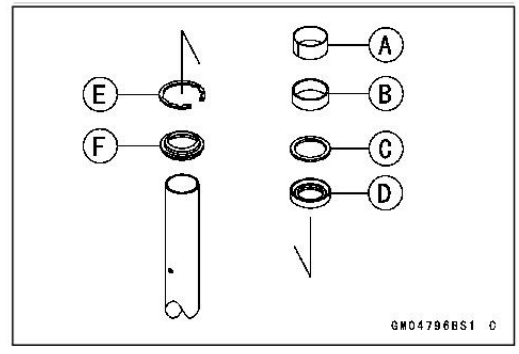
- Remove the front fork (see Front Fork Removal (Each Fork Leg)(13-10)).
- Drain the fork oil (see Front Fork Oil Change(13-12)).
- Remove the dust seal [A] from the outer tube.
- Remove the circlip [B].

**Special Tool - Inside Circlip Pliers: 57001-143**

- Separate the outer tube from the inner tube.




- Remove the following parts from the inner tube.
  Slide Bushing [A]
  Guide Bushing [B]
  Washer [C]
  Oil Seal [D]
  Circlip [E]
  Dust Seal [F]

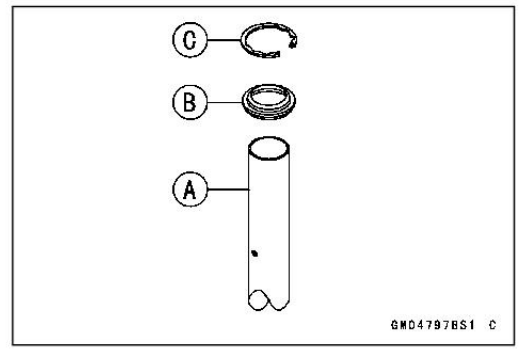



### *Front Fork Assembly*

- Replace the following parts with new ones.
  Slide Bushing
  Guide Bushing
  Oil Seal
  Circlip
  Dust Seal

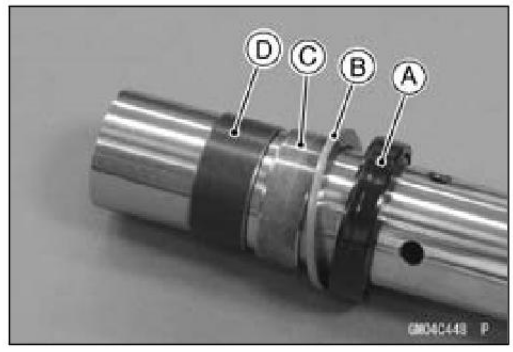
- Install the following parts to the inner tube [A].
  Dust Seal [B]
  Circlip [C]

**Special Tool - Inside Circlip Pliers: 57001-143**



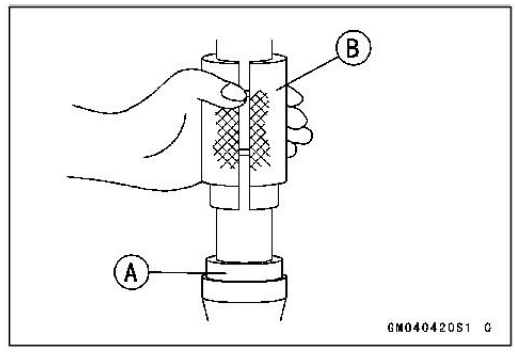
## Front Fork

- Apply grease to the oil seal lips.
- Install the oil seal [A] so that the stamp side faces lower side.
- Install the washer [B].
- Install the guide bushing [C] so that the slit of it is positioned perpendicular to the traveling direction.
- Install the slide bushing [D] so that the slit of it is positioned perpendicular to the traveling direction.




- Insert the inner tube to the outer tube.
- After installing the washer, install the oil seal [A] by using the fork oil seal driver [B].

**Special Tools - Fork Oil Seal Driver, $\phi$41: 57001-1288**
**or Fork Oil Seal Driver Weight, $\phi$26 –$\phi$46: 57001-1795**
**Fork Oil Seal Driver Attachment, $\phi$36 –$\phi$46: 57001-1798**

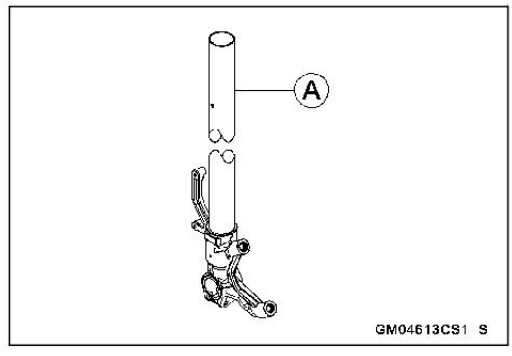



- Install the circlip and dust seal.
- Pour in the specified type of oil (see Front Fork Oil Change(13-12)).

### *Inner Tube Inspection*

- Visually inspect the inner tube [A].

★If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.

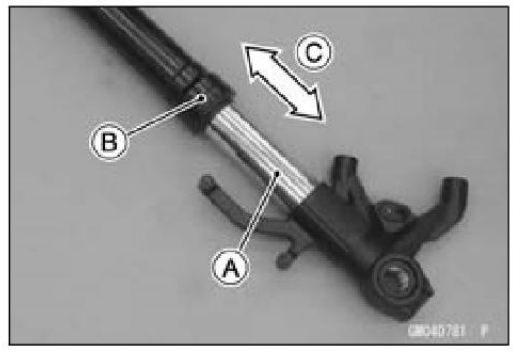



**NOTICE**

**If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.**

- Temporarily assemble the inner tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.




**⚠ WARNING**

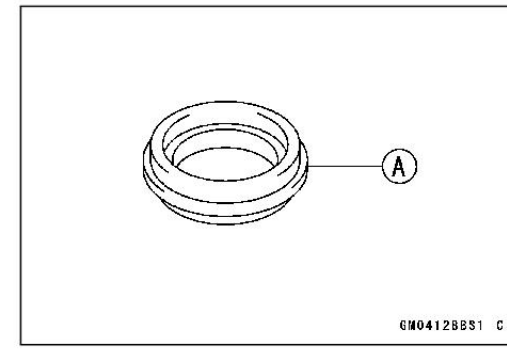
**A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.**

## Front Fork

### *Dust Seal Inspection*

- Inspect the dust seals [A] for any signs of deterioration or damage.

★Replace it if necessary.




### *Spring Tension Inspection*

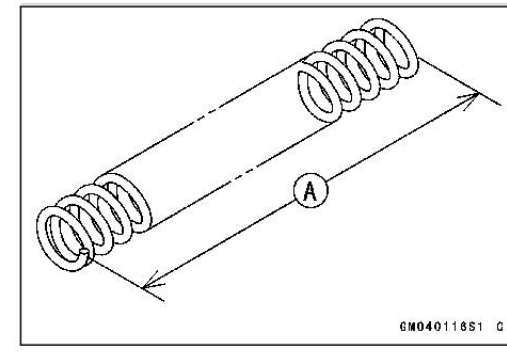
- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

**Spring Free Length**

**Standard: 306 mm (12.0 in.)**

**Service Limit: 300 mm (11.8 in.)**



## Rear Shock Absorber

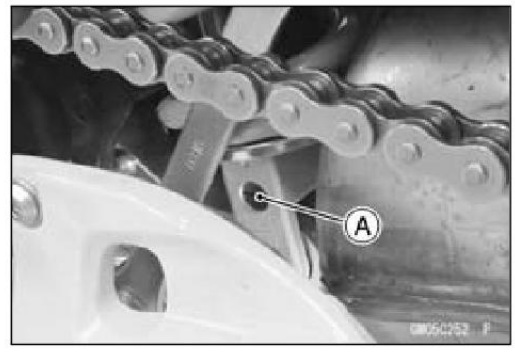
### *Rebound Damping Force Adjustment*

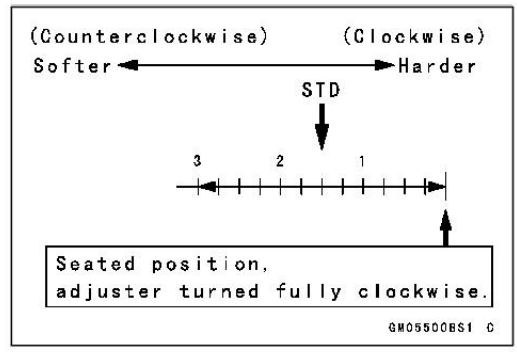
- To adjust the rebound damping force, turn the rebound damping adjuster [A] to the desired position.

○The standard adjuster setting is the **1 1/2 turns out** from the fully clockwise position.

**Rebound Damping Force Adjustment**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 3 turns out | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 0 | Strong | Hard | Heavy | Bad | High |



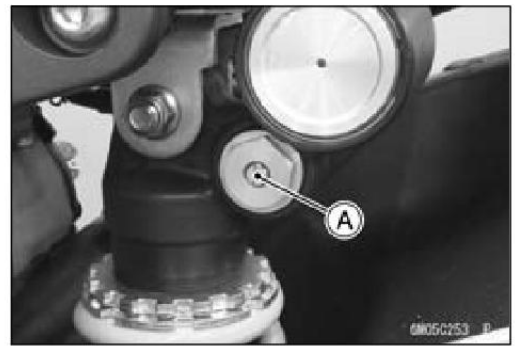

### *Compression Damping Force Adjustment*

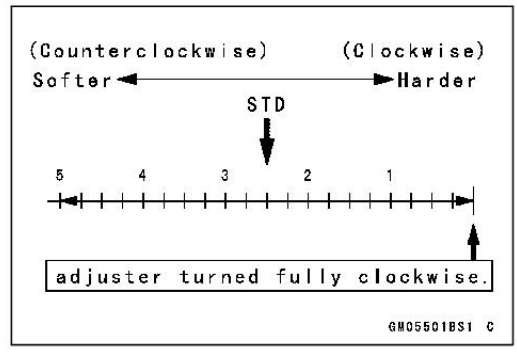
- To adjust the compression damping force, turn the compression damping adjuster [A] to the desired position.

○The standard adjuster setting is the **2 1/2 turns out** from the fully clockwise position.

**Compression Damping Force Adjustment**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 5 turns out | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 0 | Strong | Hard | Heavy | Bad | High |



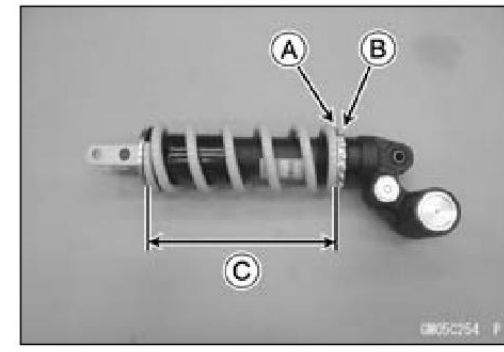




### *Spring Preload Adjustment*

- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal(13-23)).
- Loosen the locknut and turn out the adjusting nut to free the spring.

**Special Tools - Hook Wrench T=3.2 R37: 57001-1539**
**Hook Wrench: 57001-1641**

## Rear Shock Absorber




- To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B].
  Spring Length [C]

**Spring Preload Setting**

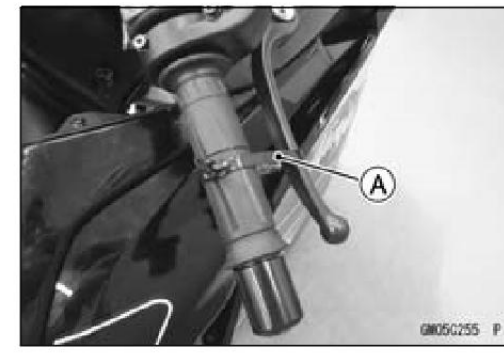
**Standard: Spring length 205 mm (8.07 in.)**

**Usable Range: Spring length 199 – 209 mm (7.83 – 8.23 in.)**

**Spring Adjustment**

| Adjuster Position | Damping Force | Setting | Load | Road | Speed |
|---|---|---|---|---|---|
| 209 mm (8.23 in.) | Weak | Soft | Light | Good | Low |
| ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 199 mm (7.83 in.) | Strong | Hard | Heavy | Bad | High |

### *Rear Shock Absorber Removal*



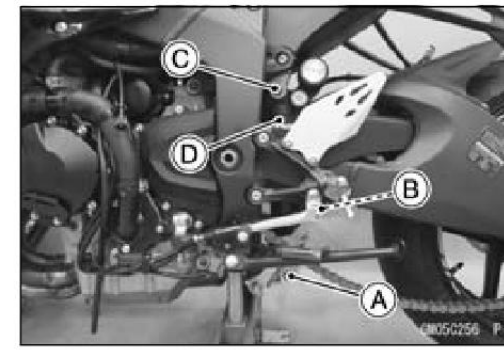

- Remove:
  Lower Fairings (see Lower Fairing Removal(15-9))
  Premuffler Chamber (see Premuffler Chamber Removal(5-38))
- Squeeze the brake lever slowly and hold it with a band [A].

**⚠ WARNING**

**Be sure to hold the front brake when removing the shock absorber, or the motorcycle may fall over. It could cause an accident and injury.**

- Raise the rear wheel off the ground with the jack.

**Special Tools - Jack: 57001-1238**
**Jack Attachment: 57001-1608**




- Remove:
  Rear Shock Absorber Nut (Lower) [A] and Bolt
  Tie-Rod Nut (Upper) [B] and Bolt
  Rear Shock Absorber Nut (Upper) [C] and Bolt
- Remove the rear shock absorber [D] downward.

## Rear Shock Absorber

### *Rear Shock Absorber Installation*

- Installation is the reverse of removal.
- Replace the following nuts with new ones.
  Rear Shock Absorber Nuts
  Tie-Rod Nut (Upper)

**NOTE**

○*When tightening the nuts, lower the rear wheel to the ground.*

- Tighten:

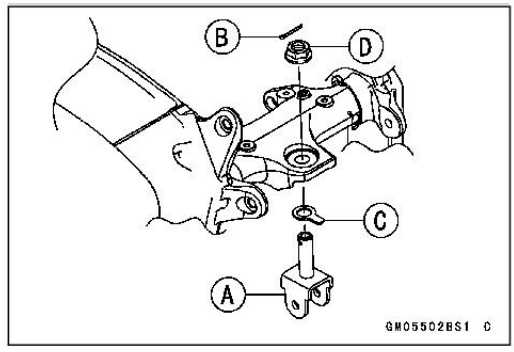
**Torque - Rear Shock Absorber Nuts: 35 N·m (3.6 kgf·m, 26 ft·lb)**
**Tie-Rod Nut: 60 N·m (6.1 kgf·m, 44 ft·lb)**

- When installing the rear shock absorber bracket [A], note the following.

○Replace the cotter pin [B] with a new one.
○Install:
  Spacer [C]
  Rear Shock Absorber Bracket
○Tighten:

**Torque - Rear Shock Absorber Bracket Nut [D]: 60 N·m (6.1 kgf·m, 44 ft·lb)**

○Insert the cotter pin and bend the pin ends.



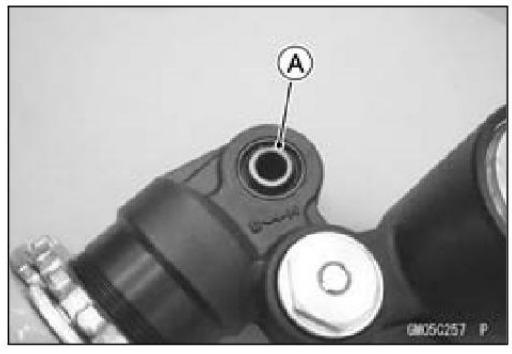

### *Rear Shock Absorber Inspection*

- Remove the rear shock absorber (see Rear Shock Absorber Removal(13-23)).
- Visually inspect the following items.
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing [A].

★If it show any signs of damage, replace it.




### *Rear Shock Absorber Scrapping*

**⚠ WARNING**

**Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the Schrader valve.**

- Remove the rear shock absorber (see Rear Shock Absorber Removal(13-23)).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

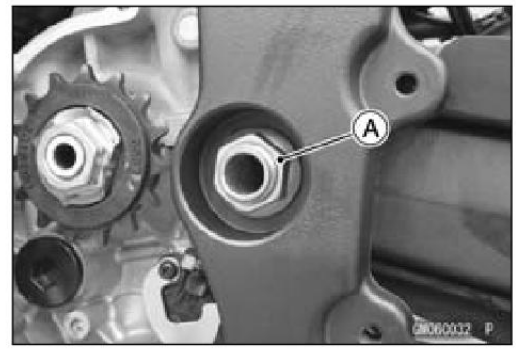
**⚠ WARNING**

**Pressurized gas can cause injury. Do not point the drill toward your face or body.**

## Swingarm

### *Swingarm Removal*

- Remove:
  Rear Wheel (see Rear Wheel Removal(10-7))
  Chain Cover (see Drive Chain Removal(11-6))
  Engine Sprocket Cover (see Engine Sprocket Removal(11-12))
  Mud Guard (see Mud Guard Removal(15-31))
  Rear Shock Absorber ((see Rear Shock Absorber Removal(13-23))
  Swingarm Pivot Shaft Nut [A]



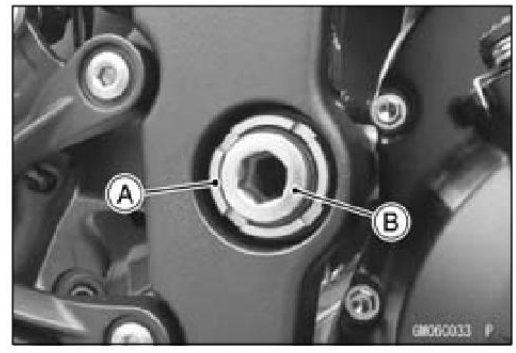

- Using the swingarm pivot nut wrench, loosen the swingarm pivot adjusting collar locknut [A].

**Special Tool - Swingarm Pivot Nut Wrench: 57001-1597**

- Turn the swingarm pivot shaft [B] counterclockwise to free the adjusting collar from the swingarm.

○Make the gap between the adjusting collar and swingarm.

- Pull out the pivot shaft to the right side and remove the swingarm.

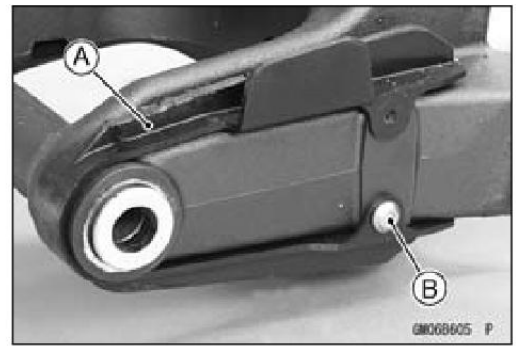



### *Swingarm Installation*

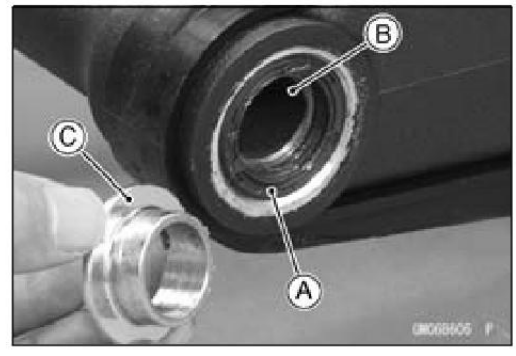
- Visually inspect the chain guide [A].

★Replace the chain guide if it shows any signs of abnormal wear or damage.

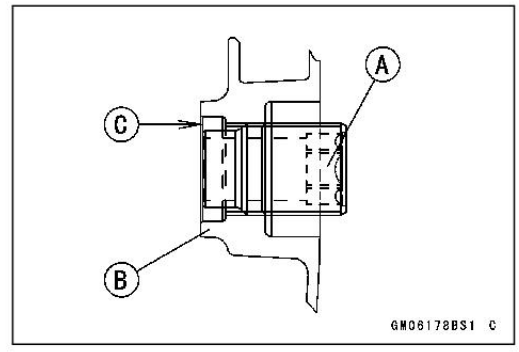
○Replace the chain guide bolt [B] with a new one.




- Apply plenty of grease to the lip of the oil seals [A].
- Be sure to install the oil seals and sleeve [B] to the swingarm.
- Fit the collar [C] on the oil seal of the left side.




- Screw the adjusting collar [A] into the frame [B] so that the collar does not project the swingarm mating surface [C].



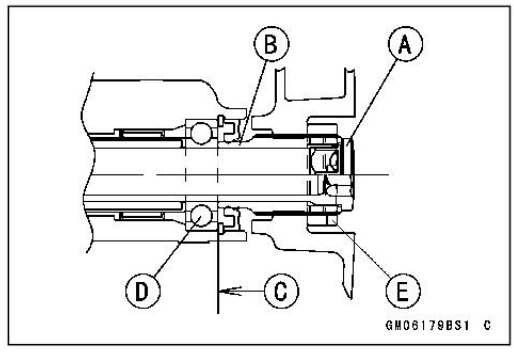
## Swingarm

- Insert the swingarm pivot shaft [A] into the adjusting collar [B] from the right side, and tighten the pivot shaft.

**NOTE**

○*Tighten the swingarm pivot shaft until the clearance [C] between the ball bearing [D] and collar come to 0 mm (0 in.).*

**Torque - Swingarm Pivot Adjusting Collar: 20 N·m (2.0 kgf·m, 15 ft·lb)**




- Using the swingarm pivot nut wrench, tighten the swingarm pivot adjusting collar locknut [E].

**Special Tool - Swingarm Pivot Nut Wrench: 57001-1597**

**Torque - Swingarm Pivot Adjusting Collar Locknut: 100 N·m (10.2 kgf·m, 73.8 ft·lb)**

- Tighten the swingarm pivot shaft nut.

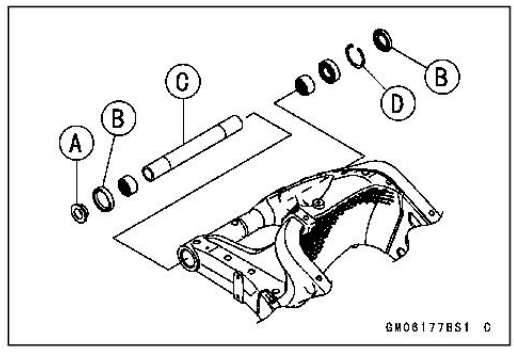
**Torque - Swingarm Pivot Shaft Nut: 110 N·m (11.2 kgf·m, 81.1 ft·lb)**

- Install the removed parts.

### *Swingarm Bearing Removal*

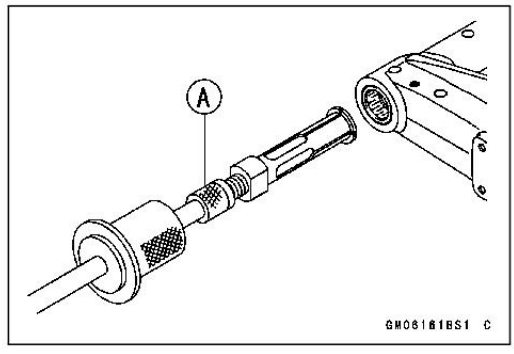
- Remove:
  Swingarm (see Swingarm Removal(13-25))
  Collar [A]
  Oil Seals [B]
  Sleeve [C]
  Circlip [D] (Right Side)

**Special Tool - Inside Circlip Pliers: 57001-143**




- Remove the ball bearing and needle bearings.

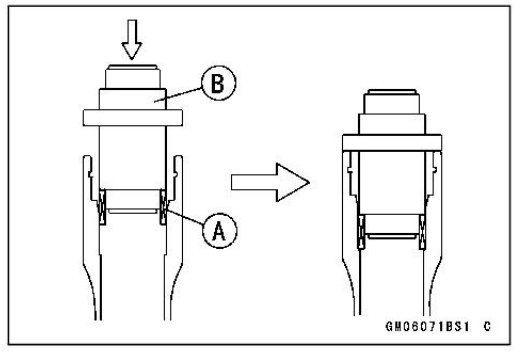
**Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058**




### *Swingarm Bearing Installation*

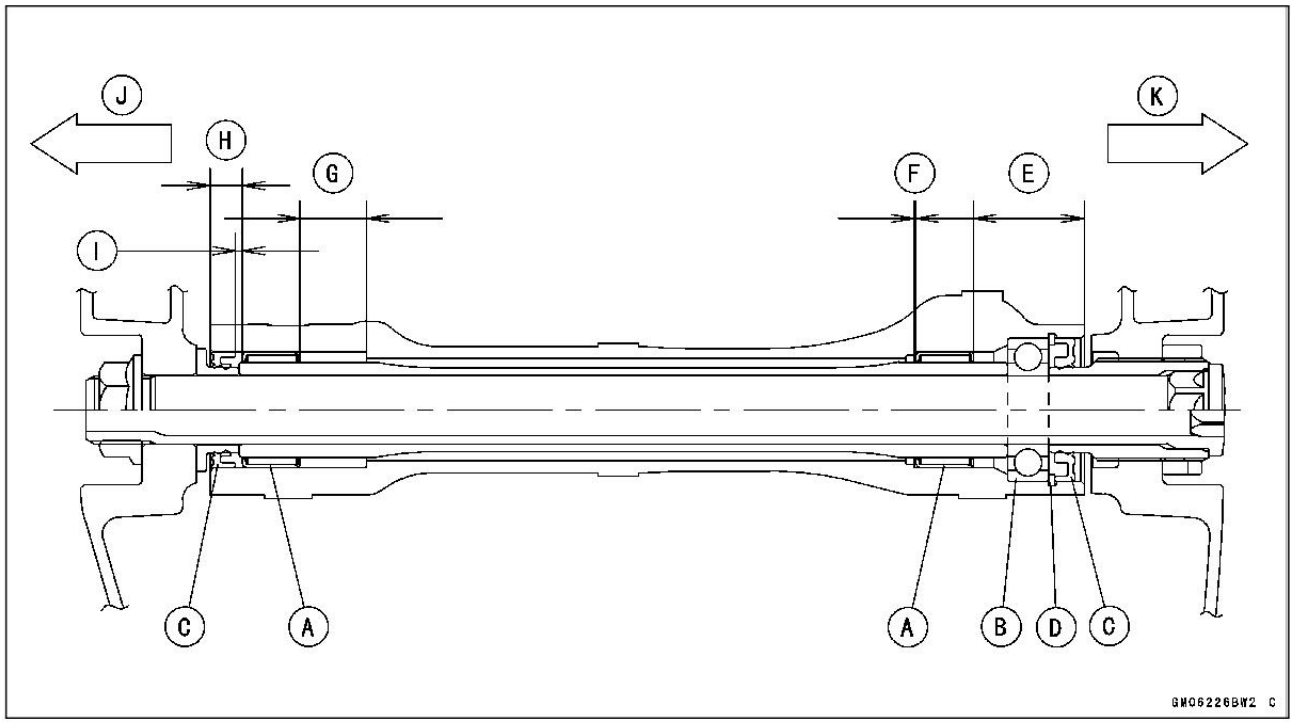
- Replace the ball and needle bearings [A] with new ones.
- Install the ball and needle bearings so that the manufacturer's marks face out.

**Special Tools - Bearing Driver Set: 57001-1129**
**Needle Bearing Driver, $\phi$28 [B]: 57001-1610**
**Spacer, $\phi$28: 57001-1637**
**Needle Bearing Driver, $\phi$20 & Spacer, $\phi$28: 57001-1678**



## Swingarm

- Install the needle bearings [A], ball bearing [B] and oil seals [C] position as shown.
  Circlip [D]
  32.5 mm (1.28 in.) [E]
  0.5 mm (0.02 in.) [F]
  19.5 mm (0.77 in.) [G]
  9.5 mm (0.37 in.) [H]
  2 mm (0.08 in.) [I]
  Left Side [J]
  Right Side [K]



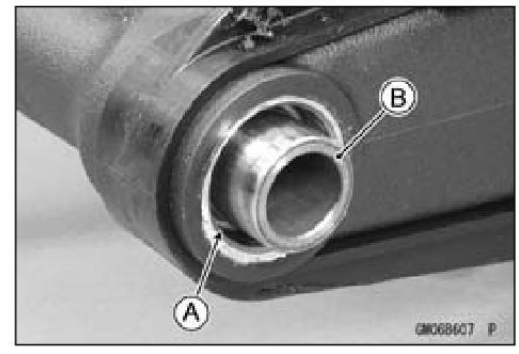

### *Swingarm Bearing, Sleeve Inspection*

| *NOTICE* |
| --- |
| **Do not remove the bearings for inspection. Removal may damage them.** |

- Inspect the needle bearings [A] and ball bearing installed in the swingarm.

○The rollers and ball in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

★If the needle bearing, and sleeve [B] show any sings of abnormal wear, discoloration, or damage, replace them as a set.



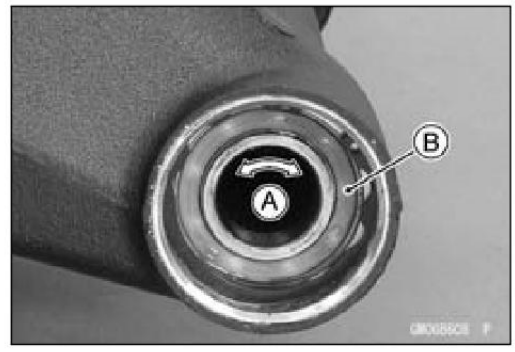
## Swingarm

- Turn the bearing in the swingarm back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.



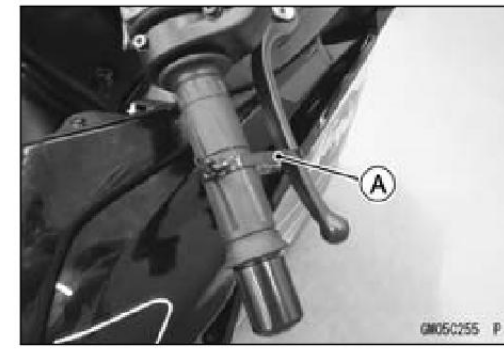

### *Swingarm Bearing Lubrication*

**NOTE**

○*Since the bearing are packed with grease and sealed, lubrication is not required.*

## Tie-Rod, Rocker Arm

### *Tie-Rod Removal*



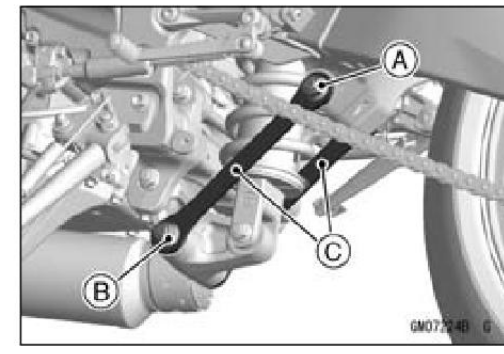

- Remove:
  Lower Fairings (see Lower Fairing Removal(15-9))
  Premuffler Chamber (see Premuffler Chamber Removal(5-38))
- Squeeze the brake lever slowly and hold it with a band [A].

**⚠ WARNING**

**Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the tie-rod.**

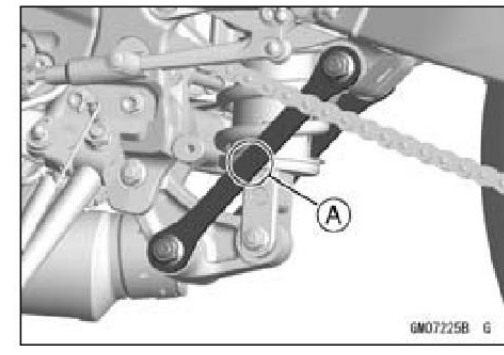
- Raise the rear wheel off the ground with the jack.

**Special Tools - Jack: 57001-1238**
**Jack Attachment: 57001-1608**




- Remove:
  Tie-Rod Nut (Upper) [A] and Bolt
  Tie-Rod Nut (Lower) [B] and Bolt
  Tie-Rods [C]

### *Tie-Rod Installation*




- Apply grease to the inside of the oil seals.
- Install the tie-rods so that the marked side faces [A] outside.
- Replace the tie-rod nuts with new ones.

**NOTE**

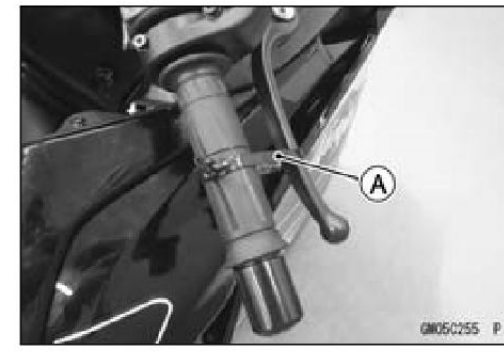
○*When tightening the nuts, lower the rear wheel to the ground.*

- Tighten:

**Torque - Tie-Rod Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)**

- Install the removed parts.

### *Rocker Arm Removal*




- Remove:
  Lower Fairings (see Lower Fairing Removal(15-9))
  Premuffler Chamber (see Premuffler Chamber Removal(5-38))
- Squeeze the brake lever slowly and hold it with a band [A].

**⚠ WARNING**

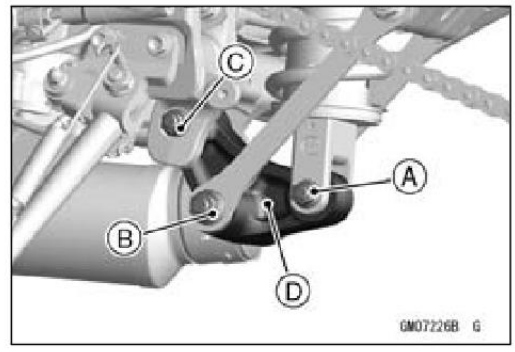
**Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the rocker arm.**

- Raise the rear wheel off the ground with the jack.

**Special Tools - Jack: 57001-1238**
**Jack Attachment: 57001-1608**

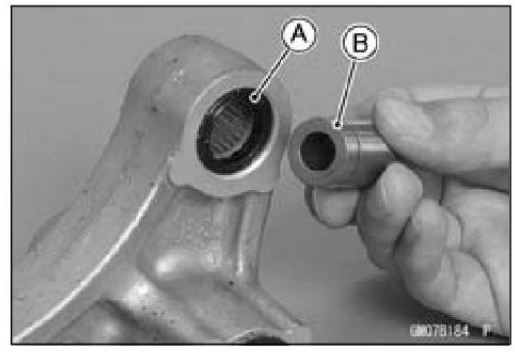
## Tie-Rod, Rocker Arm

- Remove:
  Rear Shock Absorber Nut (Lower) [A] and Bolt
  Tie-Rod Nut (Lower) [B] and Bolt
  Rocker Arm Nut [C] and Bolt
  Rocker Arm [D]




### *Rocker Arm Installation*

- Apply grease to the inside of the oil seals [A].
- Be sure to install the oil seals and sleeves [B] to the rocker arm.
- Replace the following nuts with new ones.
  Rear Shock Absorber Nut (Lower)
  Tie-Rod Nut (Lower)
  Rocker Arm Nut




**NOTE**

○*When tightening the nuts, lower the rear wheel to the ground.*

- Tighten:

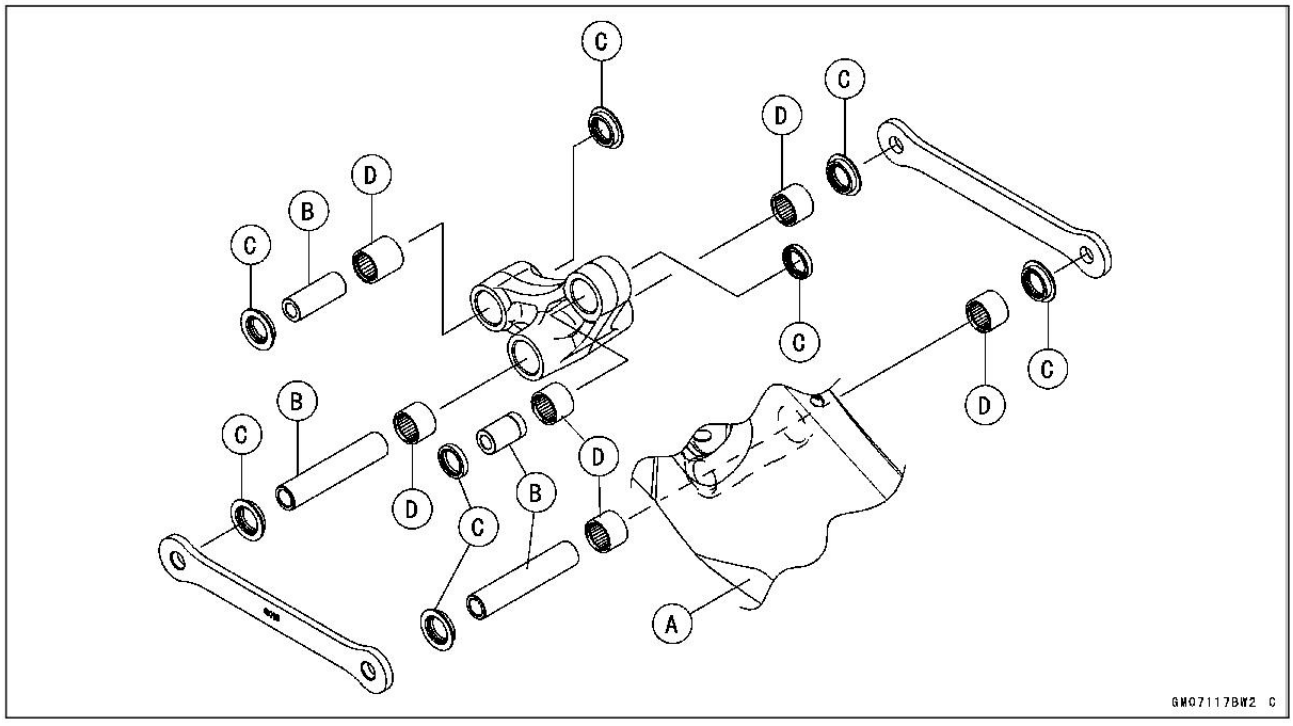
**Torque - Rocker Arm Bolt: 35 N·m (3.6 kgf·m, 26 ft·lb)**
**Tie-Rod Nuts: 60 N·m (6.1 kgf·m, 44 ft·lb)**
**Rear Shock Absorber Nut (Lower): 35 N·m (3.6 kgf·m, 26 ft·lb)**

- Install the removed parts.

## Tie-Rod, Rocker Arm

### *Tie-Rod and Rocker Arm Bearing Removal*

- Remove:
  Tie-Rods (see Tie-Rod Removal(13-29))
  Rocker Arm (see Rocker Arm Removal(13-29))
  Swingarm [A] (see Swingarm Removal(13-25))
  Sleeves [B]
  Oil Seals [C]
- Remove the needle bearings [D], using the suitable tool.




### *Tie-Rod and Rocker Arm Bearing Installation*

- Replace the needle bearings and oil seals with new ones.
- Apply plenty of grease to the lips of the oil seals.
- Install the needle bearings and oil seals in the following positions.

## Tie-Rod, Rocker Arm

○Screw the needle bearing driver [A] into the driver holder [B].

**NOTE**

○*For a bearing of inside diameter ϕ18, select the pressing side of the needle bearing driver according to its pressing depth.*

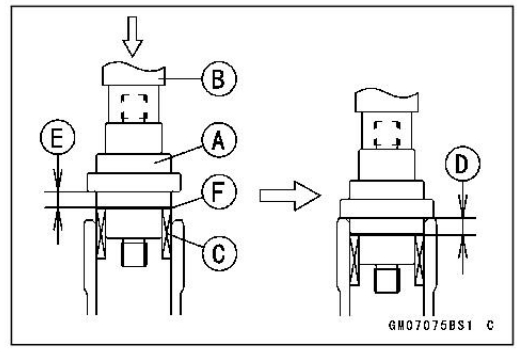
○Insert the needle bearing driver into the needle bearing [C] and press the needle bearing into the housing until the driver contacts the end surface of the housing.
Bearing Pressing Depth: 5.5 mm (0.22 in.) [D]
5.0 mm (0.20 in.) [E]
Spacer, ϕ18 [F] Thickness: 0.5 mm (0.02 in.)

**NOTE**

○*When pressing in the needle bearings to the 5.5 mm (0.22 in.) depth, adjust the pressing depth with the spacer.*

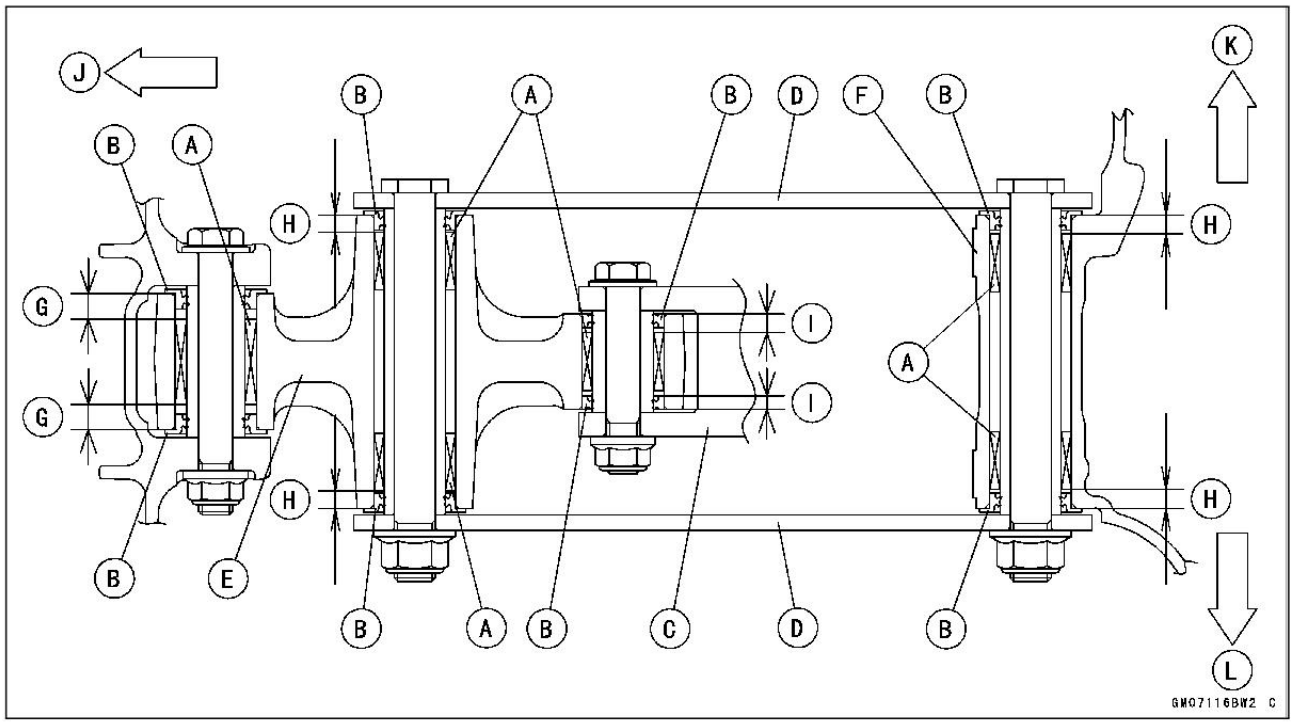
○*Install the needle bearings so that the marked side faces out.*

**Special Tools - Bearing Driver Set: 57001-1129**
**Needle Bearing Driver, ϕ17/ϕ18: 57001-1609**
**Spacer, ϕ18: 57001-1636**



## Tie-Rod, Rocker Arm

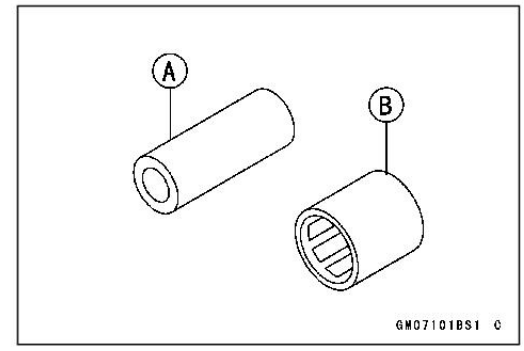
Needle Bearings [A]
Oil Seals [B]
Rear Shock Absorber [C]
Tie-Rods [D]
Rocker Arm [E]
Swingarm [F]
7.5 mm (0.30 in.) [G]
5.0 mm (0.20 in.) [H]
5.5 mm (0.22 in.) [I]
Front [J]
Right Side [K]
Left Side [L]




### *Rocker Arm/Tie-Rod Bearing, Sleeve Inspection*

***NOTICE***

**Do not remove the bearings for inspection. Removal may damage them.**




- Visually inspect the rocker arm, or tie-rod sleeves [A] and needle bearings [B].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve and needle bearings as a set.

### *Rocker Arm/Tie-Rod Bearing Lubrication*

**NOTE**

○*Since the bearings are packed with grease, lubrication is not required.*

# Steering

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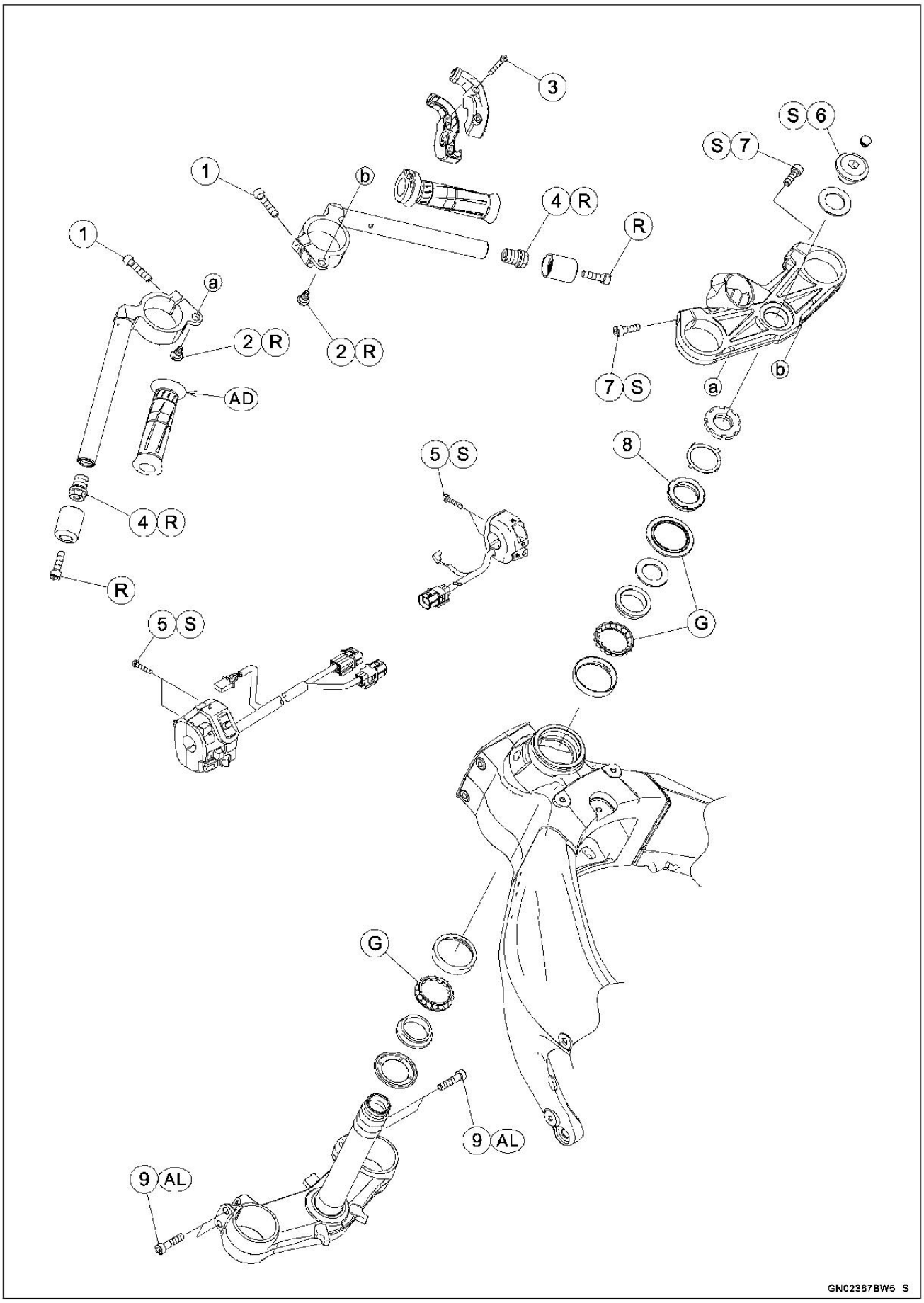
## Exploded View



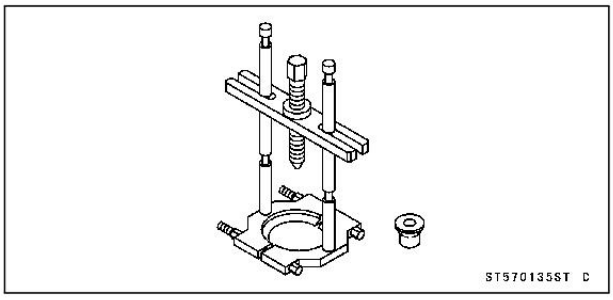
## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Handlebar Clamp Bolts | 25 | 2.5 | 18 | |
| 2 | Handlebar Positioning Bolts | 10 | 1.0 | 89 in·lb | R |
| 3 | Throttle Case Bolts | 2.4 | 0.24 | 21 in·lb | |
| 4 | Handlebar End Bolts | 25 | 2.5 | 18 | R |
| 5 | Switch Housing Screws | 2.4 | 0.24 | 21 in·lb | S |
| 6 | Steering Stem Head Bolt | 80 | 8.2 | 59 | S |
| 7 | Front Fork Clamp Bolts (Upper) | 20 | 2.0 | 15 | S |
| 8 | Steering Stem Nut | 28 | 2.9 | 21 | |
| 9 | Front Fork Clamp Bolts (Lower) | 25 | 2.5 | 18 | AL |

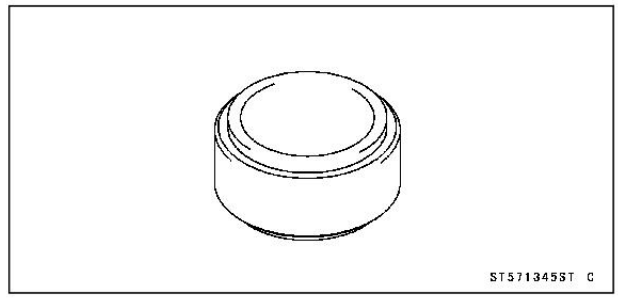
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

## Special Tools

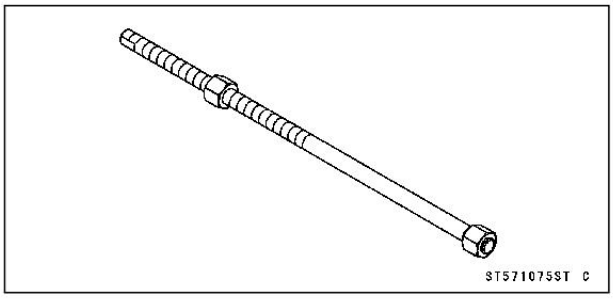
**Bearing Puller:**
**57001-135**



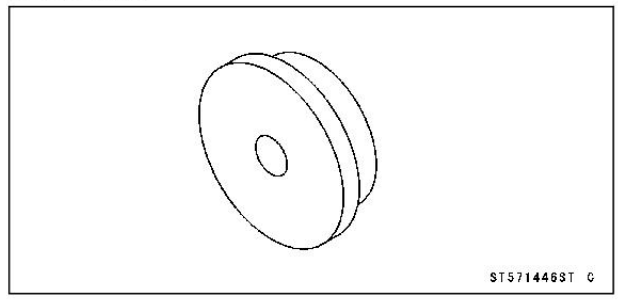

**Steering Stem Bearing Driver Adapter, $\phi$41.5:**
**57001-1345**



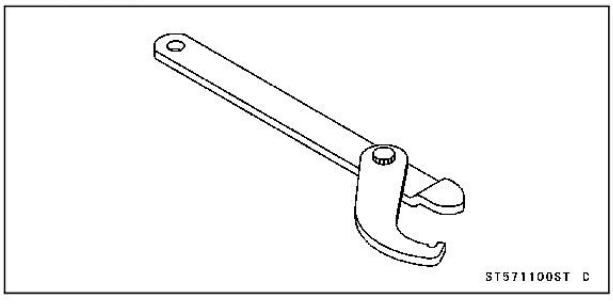

**Head Pipe Outer Race Press Shaft:**
**57001-1075**



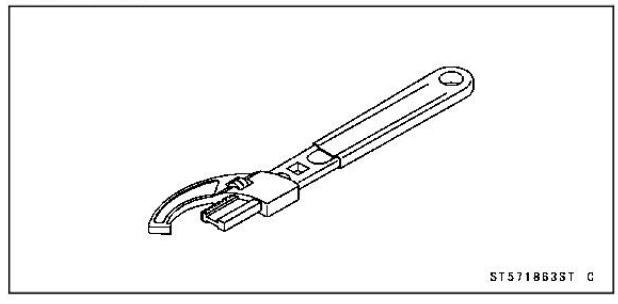

**Head Pipe Outer Race Driver, $\phi$55:**
**57001-1446**



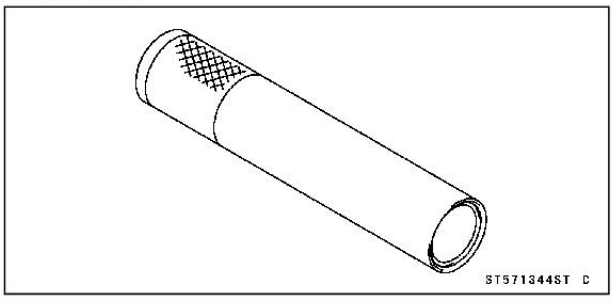

**Steering Stem Nut Wrench:**
**57001-1100**




**Adjustable Hook Wrench:**
**57001-1863**




**Steering Stem Bearing Driver, $\phi$42.5:**
**57001-1344**



## Steering

### *Steering Inspection*

- Refer to the Steering Play Inspection (see Steering Play Inspection(2-57)).

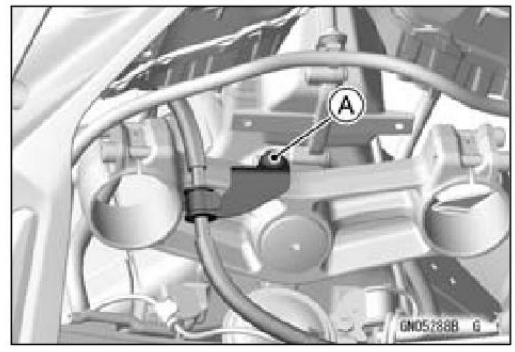
### *Steering Adjustment*

- Refer to the Steering Play Adjustment (see Steering Play Adjustment(2-58)).

## Steering Stem

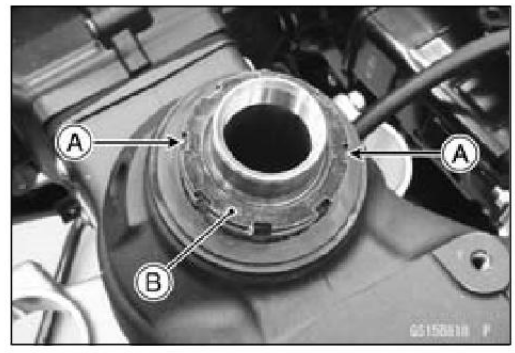
### *Stem, Stem Bearing Removal*

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Front Wheel (see Front Wheel Removal(10-6))
  Front Fender (see Front Fender Removal(15-24))
  Steering Stem Head with Handlebars (see Handlebar Removal(14-10))
  Front Forks (see Front Fork Removal (Each Fork Leg)(13-10))



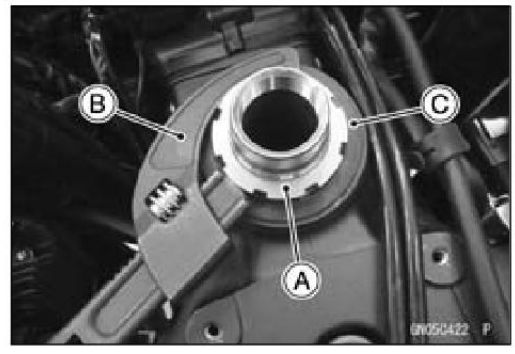

- For other than ABS equipped models, remove the bolt [A] from the steering stem.
- Bend the claws [A] of the claw washer straighten.
- Remove the steering stem locknut [B].

**Special Tool - Steering Stem Nut Wrench: 57001-1100**
**or Adjustable Hook Wrench: 57001-1863**




- Remove the claw washer.
- Pushing up the stem base, and remove the steering stem nut [A].

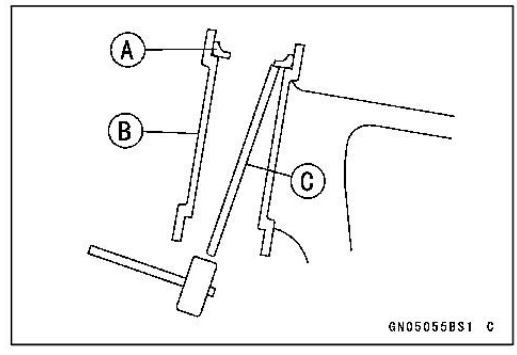
**Special Tool - Steering Stem Nut Wrench: 57001-1100**
**or Adjustable Hook Wrench [B]: 57001-1863**



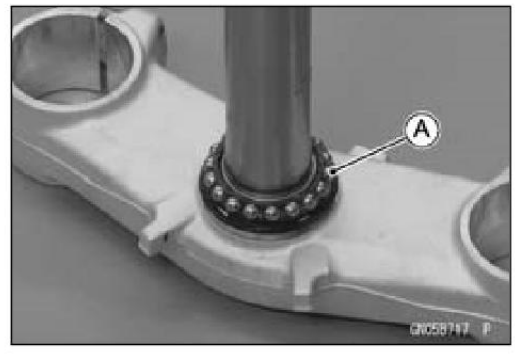

- Remove:
  Steering Stem
  Stem Cap [C]
  Washer
  Upper Ball Bearing Inner Race and Ball Bearing
- To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.

**NOTE**

○*If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.*



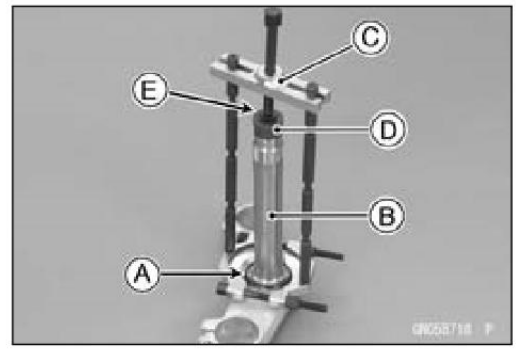

- Remove the lower ball bearing [A] from the steering stem.



## Steering Stem

● Remove the lower bearing inner race (with its grease seal) [A] which is pressed onto the steering stem [B] with the bearing puller [C], suitable collar [D] and adapter [E].

**Special Tool - Bearing Puller: 57001-135**

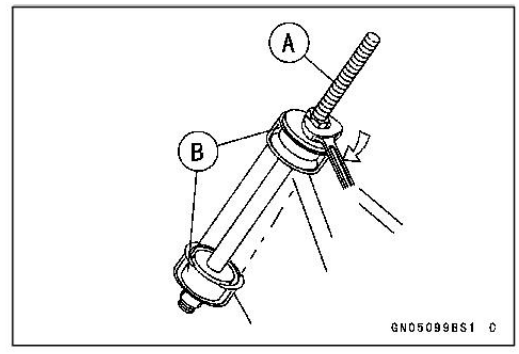



### *Stem, Stem Bearing Installation*

● Replace the bearing outer races with new ones.
● Drive them into the head pipe at the same time.

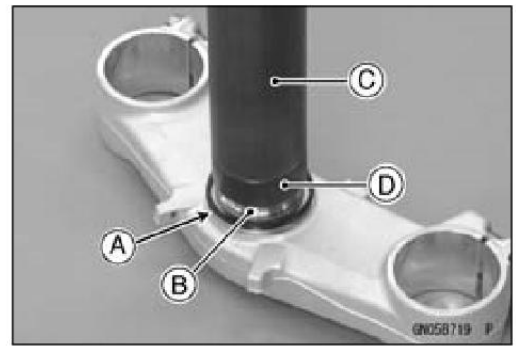
**Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075**
**Head Pipe Outer Race Driver, φ55 [B]: 57001 -1446**

● Apply grease to the outer races.

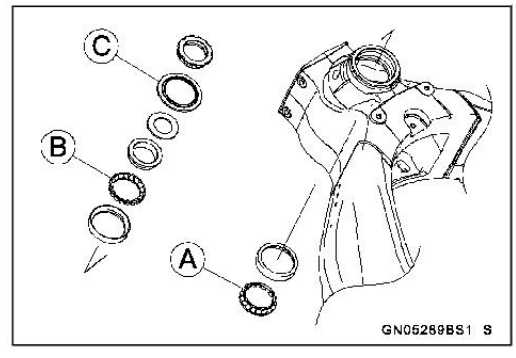



● Replace the oil seal [A] and bearing inner races [B] with new ones.
● Apply grease to the oil seal.
● Install the oil seal on the steering stem, and drive the lower ball bearing inner race applied the grease onto the stem.

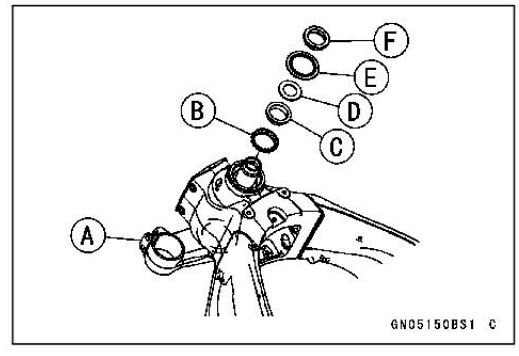
**Special Tools - Steering Stem Bearing Driver, φ42.5 [C]: 57001-1344**
**Steering Stem Bearing Driver Adapter, φ41.5 [D]: 57001-1345**




● Apply grease to the lower ball bearing [A], and install it onto the steering stem.
○The lower and upper ball bearings are identical.
● Apply grease to the upper ball bearing [B] and stem cap [C].




● Install the steering stem [A] through the head pipe and install the upper bearing [B] and inner race [C] on it.
● Install:
Washer [D]
Stem Cap [E]
Steering Stem Nut [F]



## Steering Stem

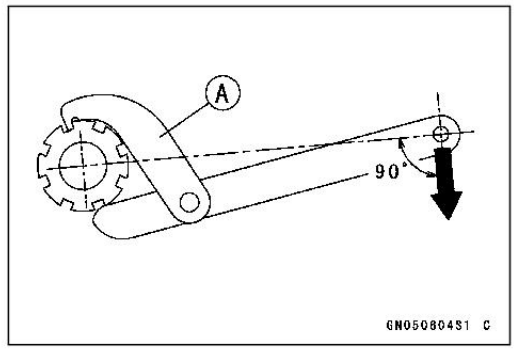
- Settle the bearings in place as follows.

○Tighten the steering stem nut with **65 N·m (6.6 kgf·m, 48 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A] or adjustable hook wrench.

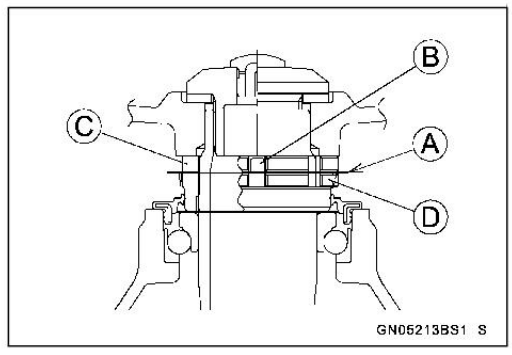
○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

**Special Tool - Steering Stem Nut Wrench: 57001-1100**
**or Adjustable Hook Wrench: 57001-1863**

**Torque - Steering Stem Nut: 28 N·m (2.9 kgf·m, 21 ft·lb)**




- Install the claw washer [A] so that its bent claws [B] faces upward, and engage the bent claws with the grooves of steering stem locknut [C].
- Hand tighten the steering stem locknut until it contacts against the claw washer.
- Check if the grooves of the steering stem locknut aligns with the grooves of the steering stem nut [D].

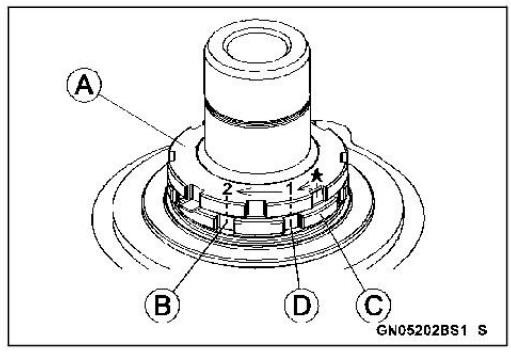



**In case of the claws positioned between the grooves:**

- Tighten the steering stem locknut [A] until the straight claws aligned with 2nd groove [B] of the steering stem nut [C].

○Count the number of groove from the **first** aligned groove [D] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.

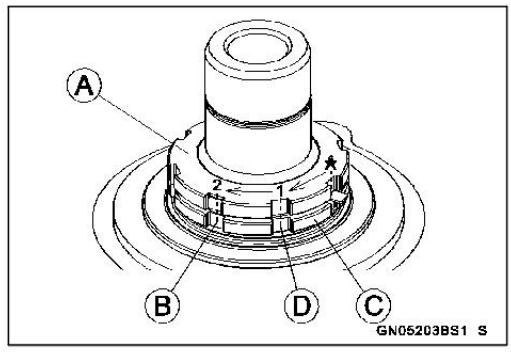



**In case of the claws aligned with the grooves:**

- Tighten the steering stem locknut [A] until the straight claws aligned with 2nd groove [B] of the steering stem nut [C].

○Count the number of groove from the **next** aligned groove [D] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.



## Steering Stem

- Install the stem head.
- Install the washer, and temporary tighten the stem head bolt.
- Install the front forks (see Front Fork Installation (Each Fork Leg)(13-11)).

**NOTE**

○*Tighten the front fork clamp bolts (upper) first, next the stem head bolt, last the front fork clamp bolts (lower).*
○*Tighten the two front fork clamp bolts (lower) alternately two times to ensure even tightening torque.*

**Torque - Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)**
**Steering Stem Head Bolt: 80 N·m (8.2 kgf·m, 59 ft·lb)**
**Front Fork Clamp Bolts (Lower): 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

**⚠ WARNING**

**If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).**

- Install the removed parts.

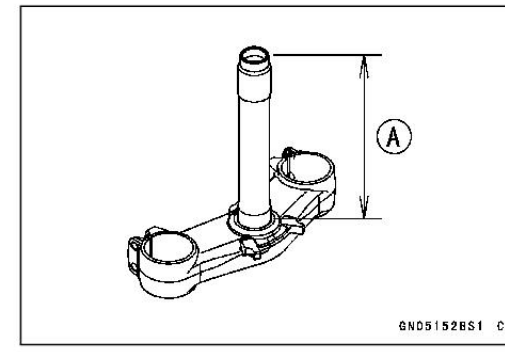
### *Steering Stem Bearing Lubrication*

- Refer to the Steering Stem Bearing Lubrication (see Steering Stem Bearing Lubrication(2-59)).

### *Steering Stem Warp Inspection*

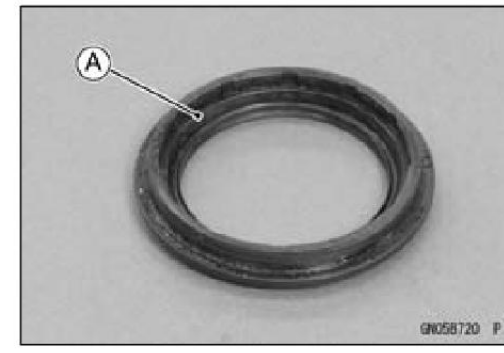
- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

★If the steering stem [A] is bent, replace the steering stem.




### *Stem Cap Deterioration, Damage Inspection*

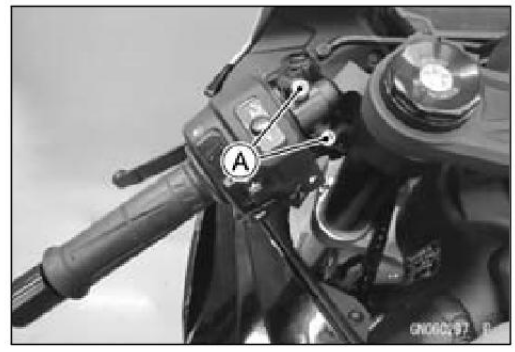
★Replace the stem cap if its seal lip [A] shows damage.



## Handlebar

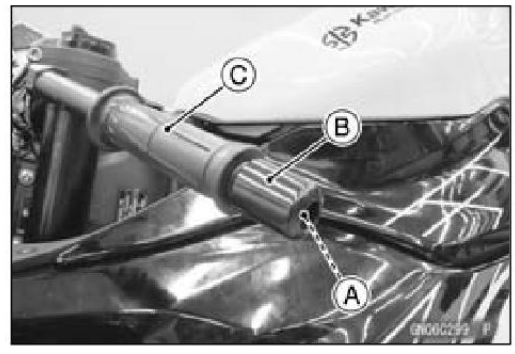
### *Handlebar Removal*

- Remove:
  Bolts [A]
  Clutch Lever Holder Assembly

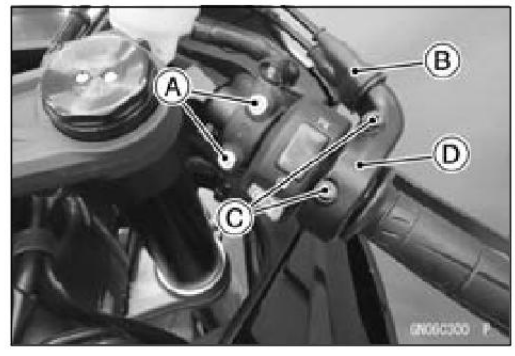



- Remove:
  Left Switch Housing Screws [A]
  Left Switch Housing

- Remove:
  Bolt [A]
  Handlebar Weight [B]
  Left Handlebar Grip [C]



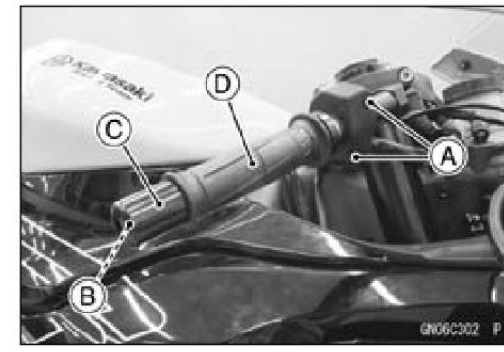

- Remove:
  Front Master Cylinder Clamp Bolts [A]
  Front Master Cylinder Assembly
- Slide the dust cover [B].
- Remove:
  Throttle Case Bolts [C]
  Throttle Case [D]



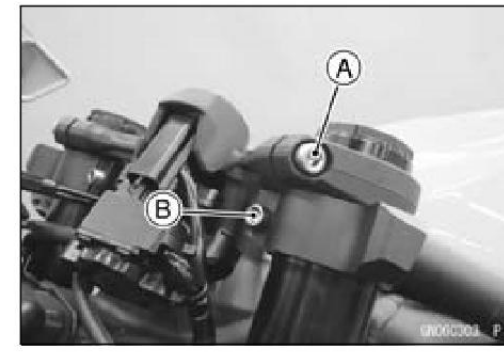

- Disconnect the throttle cable upper ends [A].

## Handlebar

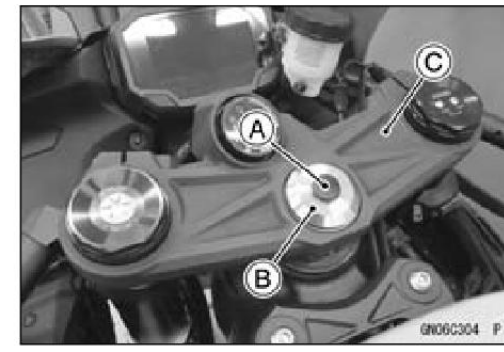
- Remove:
  Right Switch Housing Screws [A]
  Right Switch Housing
  Bolt [B]
  Handlebar Weight [C]
  Throttle Grip [D]



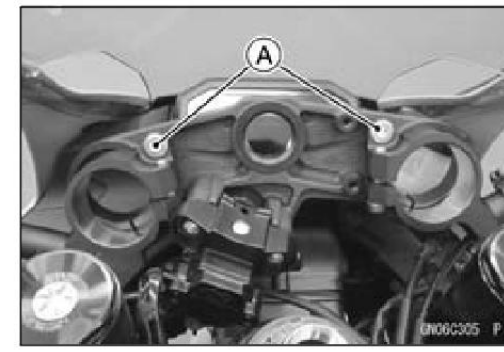

- Loosen:
  Front Fork Clamp Bolt (Upper) [A] (Both Sides)
  Handlebar Clamp Bolt [B] (Both Sides)




- Remove:
  Steering Stem Head Bolt Plug [A]
  Steering Stem Head Bolt [B] and Washer
  Steering Stem Head [C] with Handlebars

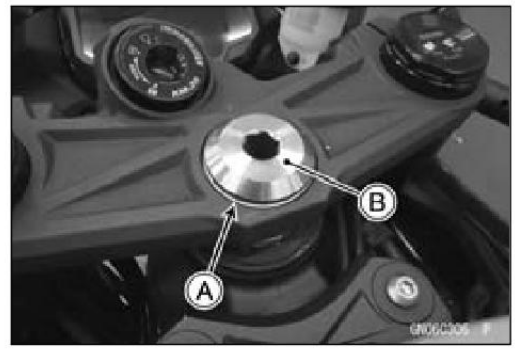



- Remove:
  Handlebar Positioning Bolts [A]
  Handlebars



## Handlebar

### *Handlebar Installation*




- Replace the handlebar positioning bolts with new ones.
- Tighten:

**Torque - Handlebar Positioning Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Install the steering stem head with handlebars.
- Install the washer [A] and steering stem head bolt [B].
- Tighten:

**Torque - Steering Stem Head Bolt: 80 N·m (8.2 kgf·m, 59 ft·lb)**
**Front Fork Clamp Bolts (Upper): 20 N·m (2.0 kgf·m, 15 ft·lb)**
**Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**

**NOTE**

○*Tighten the steering stem head bolt before tightening the front fork clamp bolts (upper) and handlebar clamp bolts.*

**⚠ WARNING**

**If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).**

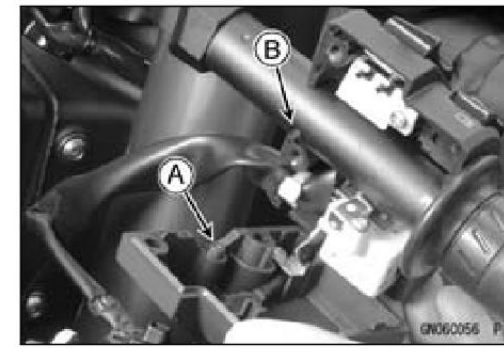
- Install the steering stem head bolt plug to the steering stem head bolt.
- Apply adhesive cement to the inside of the left handlebar grip.
- Replace the handlebar weight bolts with new ones.
- Install the left handlebar grip, throttle grip and left/right handlebar weight.

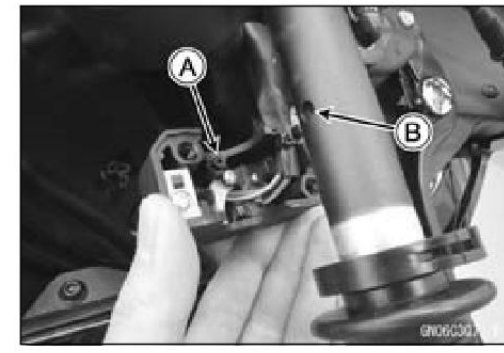
## Handlebar

● Install the left and right switch housings.
○Fit the projection [A] into a hole [B] in the handlebar.
● Tighten:

**Torque - Switch Housing Screws: 2.4 N·m (0.24 kgf·m, 21 in·lb)**

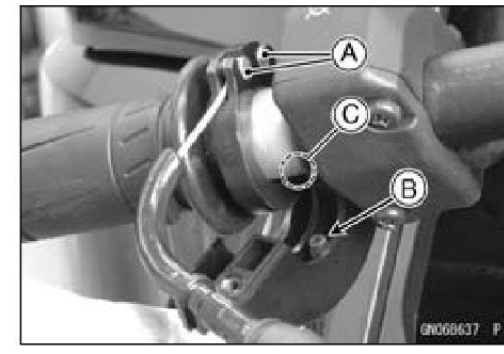
○Tighten the upper switch housing screw first to bring the upper mating surface into contact closely.
○After tightening, the lower mating surface does not contact closely.




● Install the throttle cable tips [A].
● Install the throttle case.
○Fit the projection [B] into a hole [C] in the handlebar.
● Tighten:

**Torque - Throttle Case Bolts: 2.4 N·m (0.24 kgf·m, 21 in·lb)**




● Install:
Clutch Lever Holder Assembly (see Clutch Lever Assembly Installation(6-7))
Front Master Cylinder Assembly (see Front Master Cylinder Installation(12-18))

# Frame

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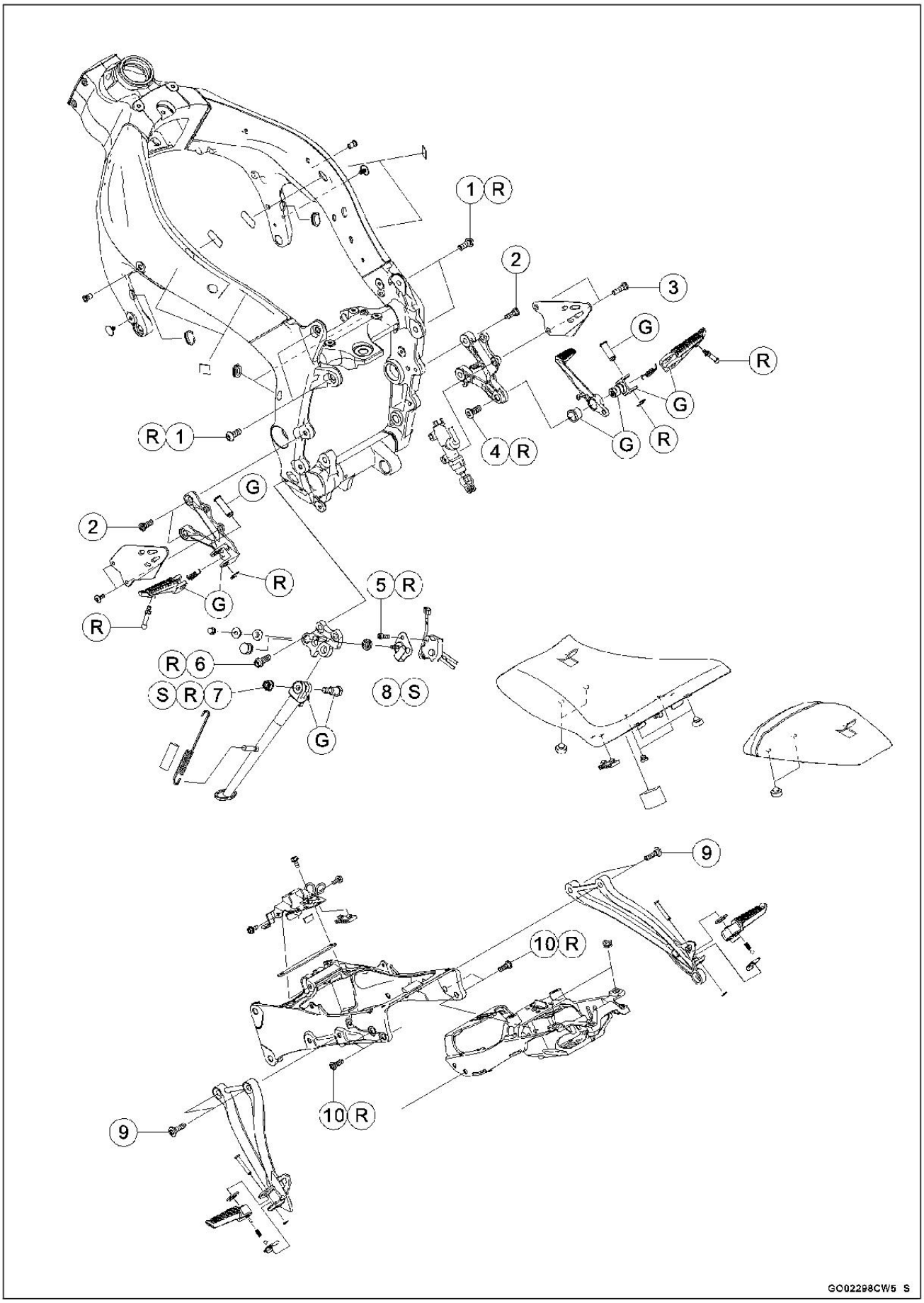
## Exploded View

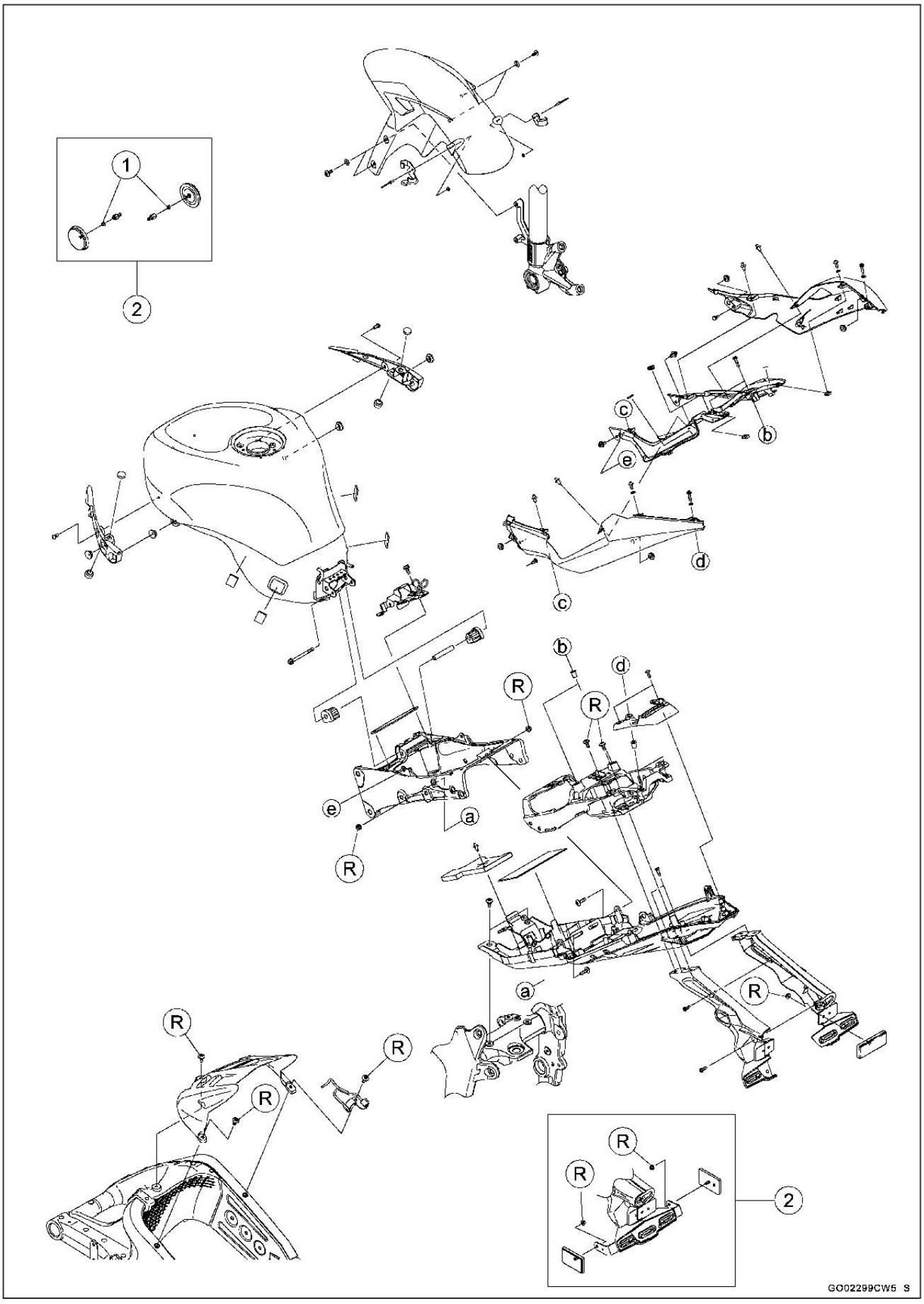


## Exploded View

| No. | Fastener | Torque | | | Re-marks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Rear Frame Bolts (M10) | 45 | 4.6 | 33 | R |
| 2 | Front Footpeg Bracket Bolts | 25 | 2.5 | 18 | |
| 3 | Rear Master Cylinder Bolts | 25 | 2.5 | 18 | |
| 4 | Front Footpeg Bolts | 35 | 3.6 | 26 | R |
| 5 | Side Stand Switch Bolt | 9.0 | 0.92 | 80 in·lb | R |
| 6 | Side Stand Bracket Bolts | 50 | 5.1 | 37 | R |
| 7 | Side Stand Nut | 45 | 4.6 | 33 | R, S |
| 8 | Side Stand Bolt | 30 | 3.1 | 22 | S |
| 9 | Rear Footpeg Bracket Bolts | 25 | 2.5 | 18 | |
| 10 | Rear Frame Bolts (M8) | 25 | 2.5 | 18 | R |

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

## Exploded View

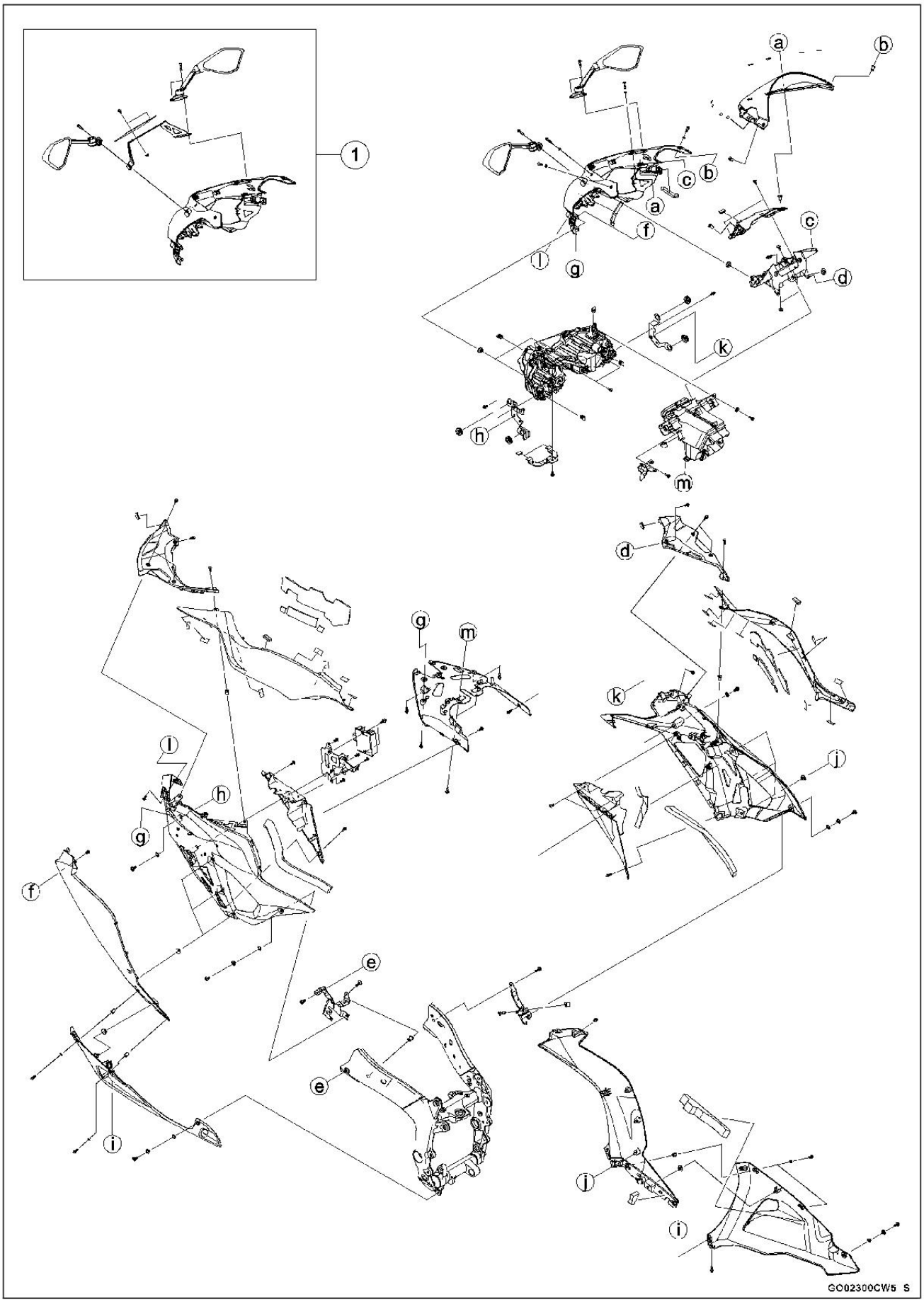


## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Front Side Reflector Nuts | 3.4 | 0.35 | 30 in·lb | |

2. Equipped Models
R: Replacement Parts

## Exploded View



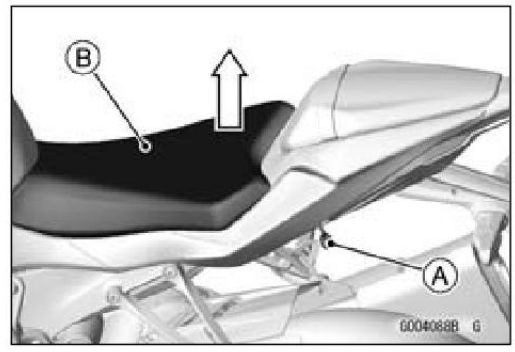
## Exploded View

1. Equipped Models

## Seats

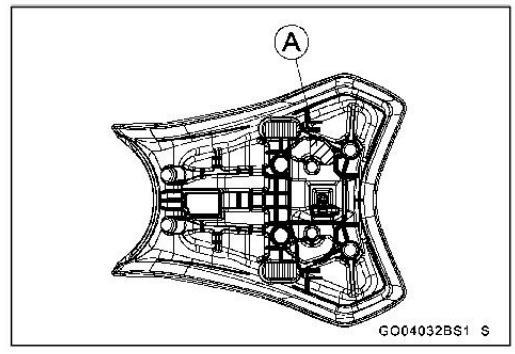
### *Front Seat Removal*

- Insert the ignition switch key [A] into the seat lock.
- Pull up the rear part of the front seat [B] upward while turning the key clockwise.
- Remove the front seat.

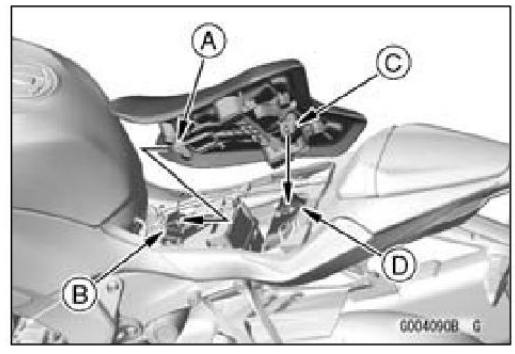



### *Front Seat Installation*

- Check that the pad [A] is in place on the front seat.

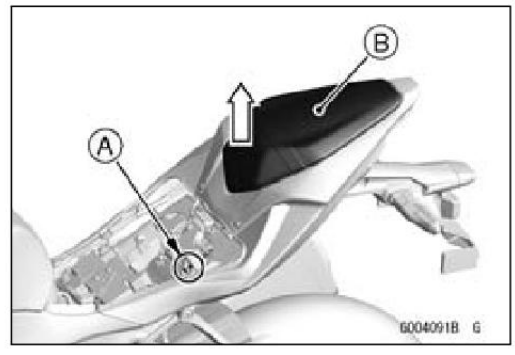



- Insert the seat hook [A] into the seat bracket [B].
- Insert the seat latch [C] into the latch hole [D].
- Push down the rear part of the front seat until the lock clicks.



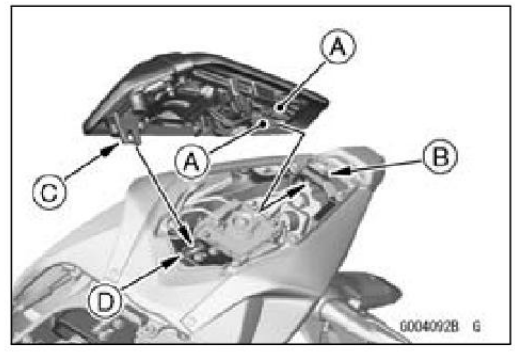

### *Rear Seat Removal*

- Remove:
  Front Seat (see Front Seat Removal(15-8))
- Pull the cable [A], and pull up the front part of the rear seat [B].
- Remove the rear seat.




### *Rear Seat Installation*

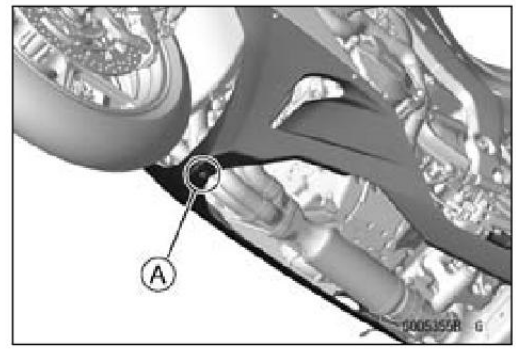
- Slip the seat hooks [A] under the rib [B] on the rear frame rear.
- Insert the seat latch [C] into the latch hole [D].
- Push down the front part of the rear seat until the lock clicks.



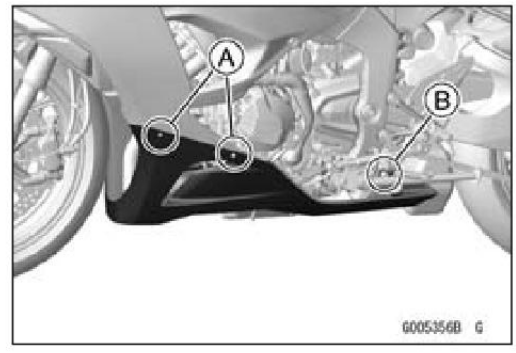
## Fairings

### *Lower Fairing Removal*

- Remove:
  Quick Rivet [A]



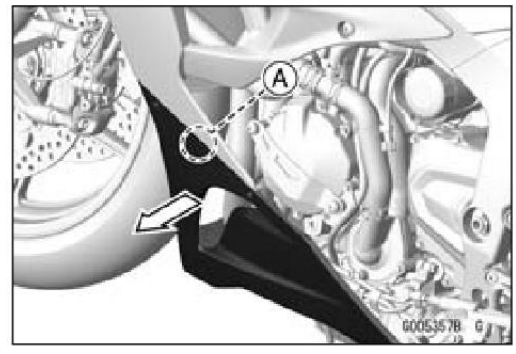

- Remove:
  Bolts [A] and Washers
  Bolt [B], Collar and Washer



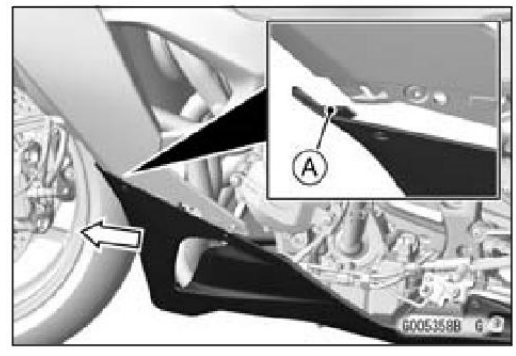

- Pull the lower fairing outward to clear the projection [A].

**NOTE**

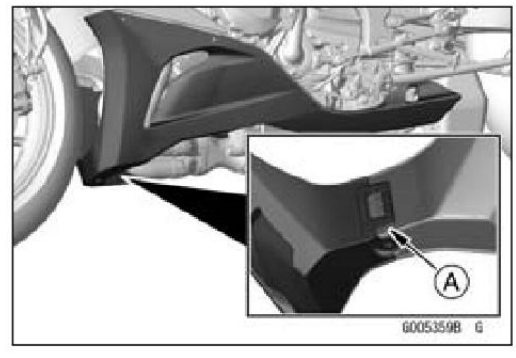
○*For the left lower fairing removal, raise the rear wheel off the ground with the stand if necessary.*




- Pull the lower fairing forward to clear the hook [A].



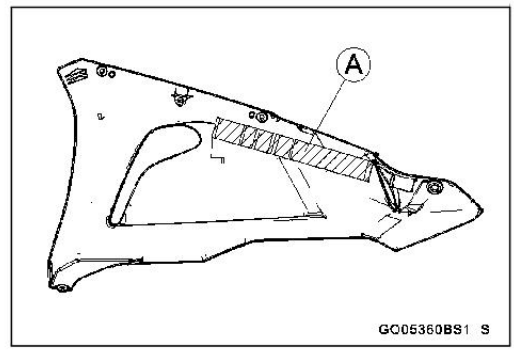

- Pull the lower fairing outward to clear the hook [A], and remove the lower fairing.



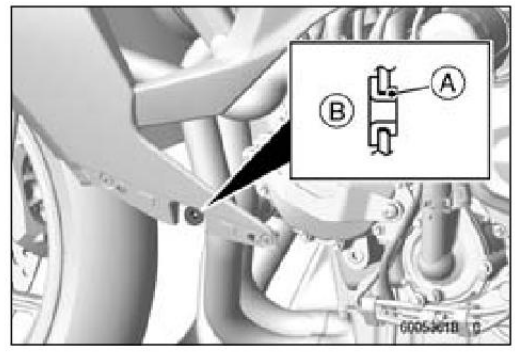
## Fairings

### *Lower Fairing Installation*

- Installation is the reverse of removal.
- Check that the pad [A] is in place on the right lower fairing.

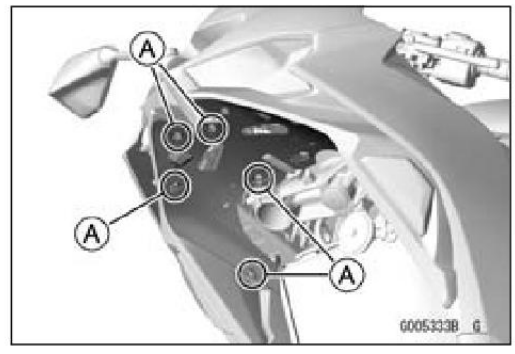



- Check that the grommet [A] is in place on the middle fairing.
  Outside [B]

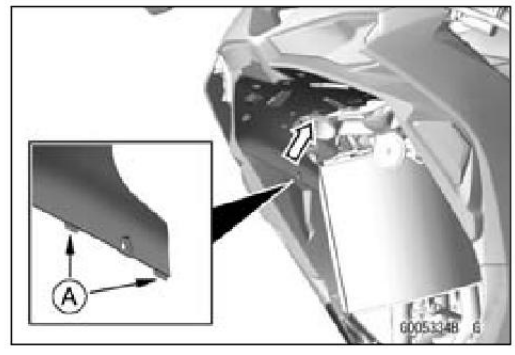



### *Lower Inner Fairing Removal*

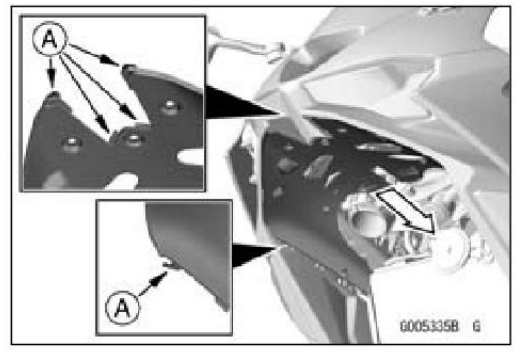
- Remove:
  Quick Rivets [A] (Both Sides)




- Pull the both sides of the lower inner fairing upward to clear the tabs [A].




- Pull the lower inner fairing rearward to clear the tabs [A].
- Remove the lower inner fairing.



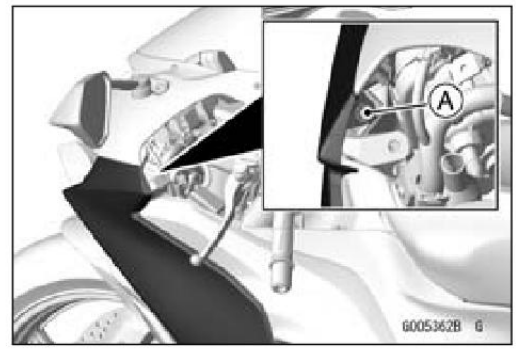

### *Lower Inner Fairing Installation*

- Installation is the reverse of removal.

## Fairings

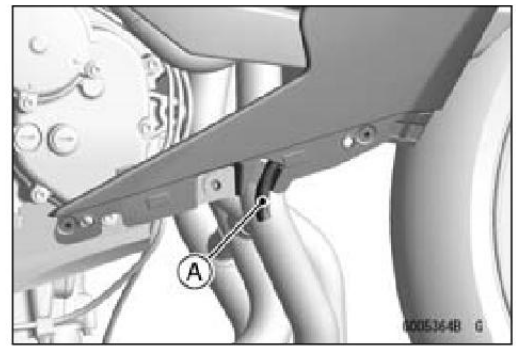
### *Middle Fairing Removal*

- Remove:
  Lower Fairing (see Lower Fairing Removal(15-9))
  Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
  Bolt [A]

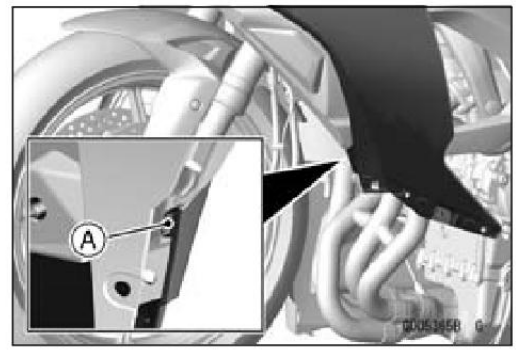



- Remove:
  Quick Rivet [A]

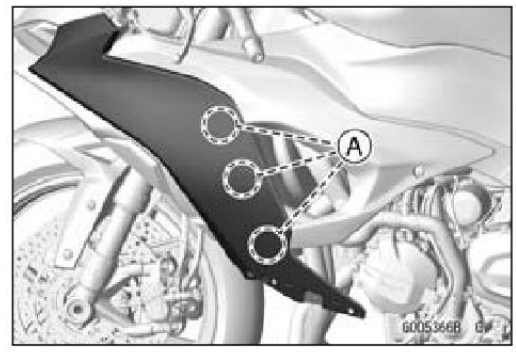
- For right side, clear the reserve tank overflow hose [A] from the middle fairing.




- Pull the middle fairing outward to clear the hook [A].

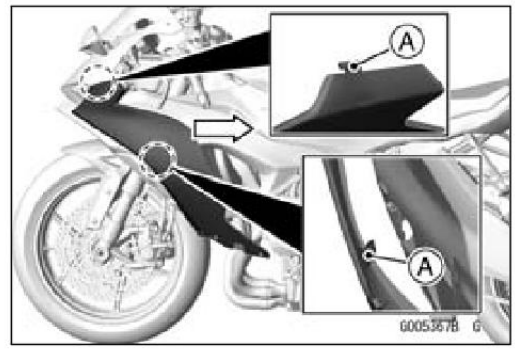



- Pull the middle fairing outward to clear the projections [A].



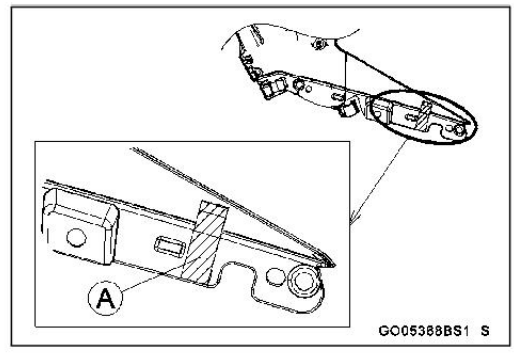
## Fairings

- Pull the middle fairing rearward to clear the hooks [A], and remove the middle fairing.

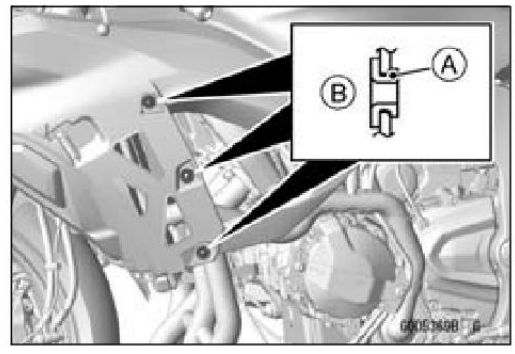



### *Middle Fairing Installation*

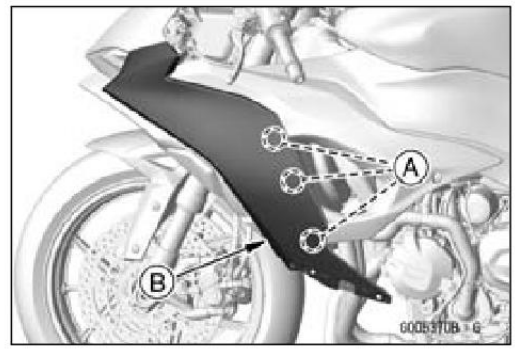
- Installation is the reverse of removal.
- Check that the pad [A] is in place on the right middle fairing.




- Check that the grommets [A] are in place on the middle inner fairing.
  Outside [B]

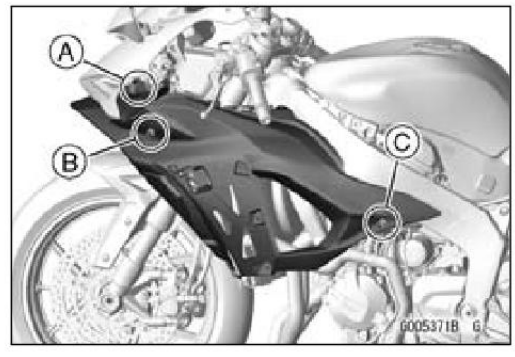



- Insert the projections [A] into the grommets.
- Insert the hook [B] of the middle fairing into the groove of the middle inner fairing.
- Run the hose correctly (see Cable, Wire, and Hose Routing section (18-2)).



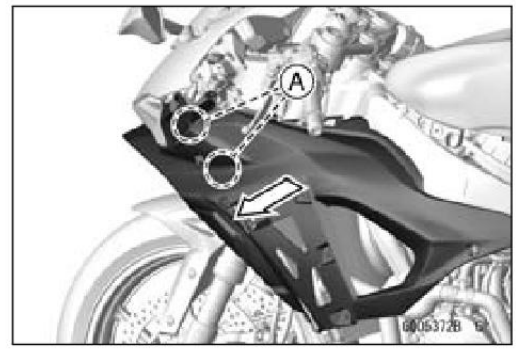

### *Middle Inner Fairing Removal*

- Remove:
  Middle Fairing (see Middle Fairing Removal(15-11))
  Side Cover (see Side Cover Removal(15-19))
  Lower Inner Fairing (see Lower Inner Fairing Removal(15-10))
  Bolt [A]
  Bolt [B] and Washer
  Bolt [C], Collar and Washer

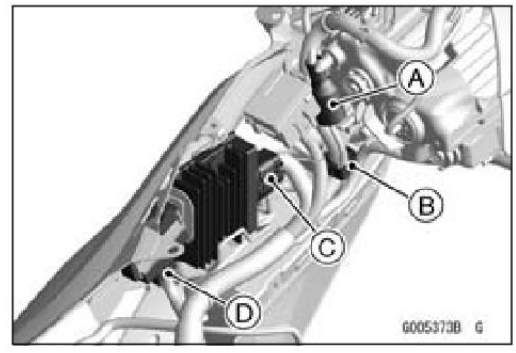


## Fairings

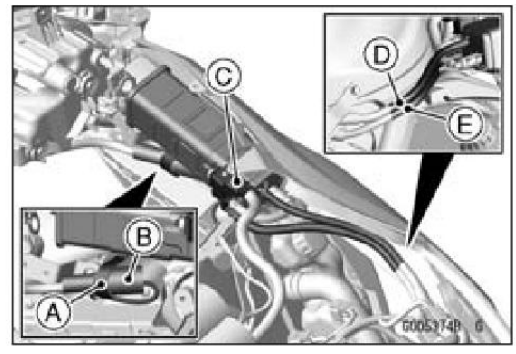
- Pull the lower fairing outward to clear the projections [A].



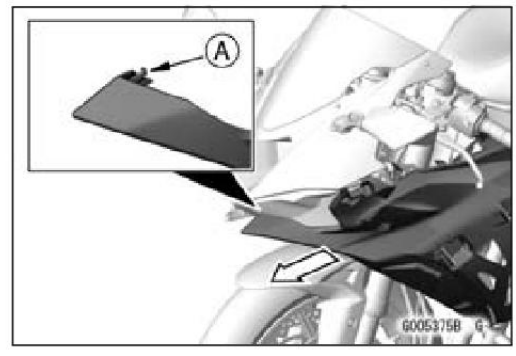

- For left side, slide the dust cover [A].
- Open the clamp [B].
- Disconnect:
  Front Left Turn Signal Light Connector
  Regulator/Rectifier Connector [C]
  Immobilizer Amplifier Connector [D] (Equipped Models)




- For right side, open the clamp [A].
- Slide the dust cover [B].
- Disconnect:
  Front Right Turn Signal Light Connector
  Purge Valve Connector [C] (Equipped Models)
  Breather Hose [D] (Equipped Models)
  Purge Valve Hose [E] (Equipped Models)

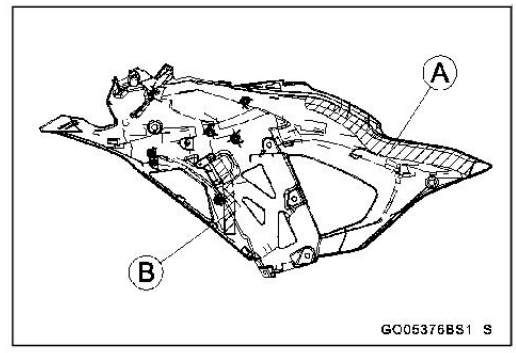



- Pull the lower fairing forward to clear the hook [A].
- Remove the middle inner fairing.



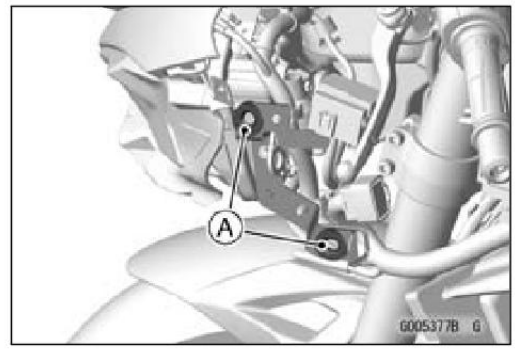

### *Middle Inner Fairing Installation*

- Installation is the reverse of removal.
- Check that the pad [A] is in place on the middle inner fairing.
- Check that the pad [B] is in place on the right middle inner fairing.



## Fairings

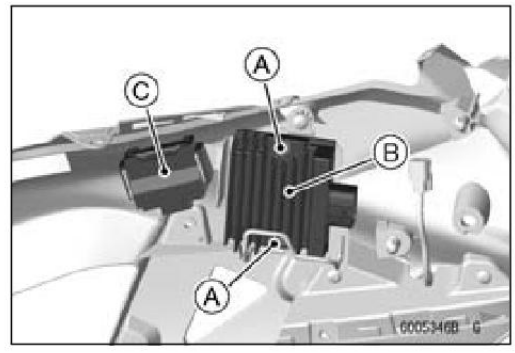
- Check that the grommets [A] are in place on the bracket.
- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).



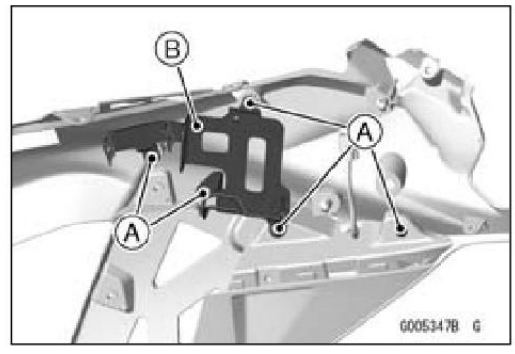

### *Middle Inner Fairing Disassembly*

**Left Side**

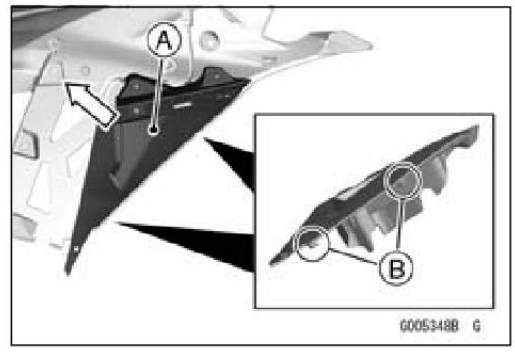
- Remove:
  Bolts [A]
  Regulator/Rectifier [B]
  Immobilizer Amplifier [C]



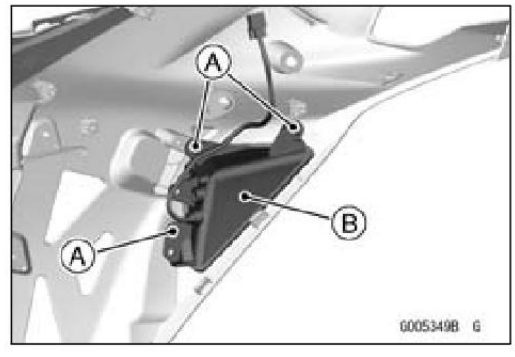

- Remove:
  Screws [A]
  Bracket [B]




- Pull the inner cover [A] to clear the hooks [B], and remove the inner cover.



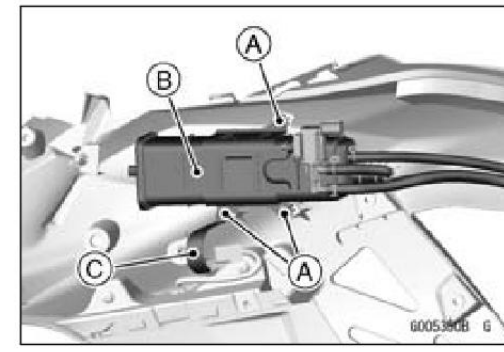

- Remove:
  Screws [A]
  Front Left Turn Signal Light [B]



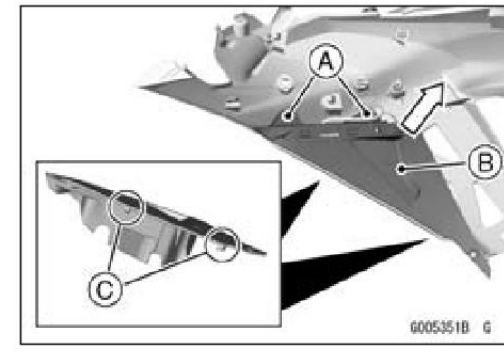
## Fairings

**Right Side**

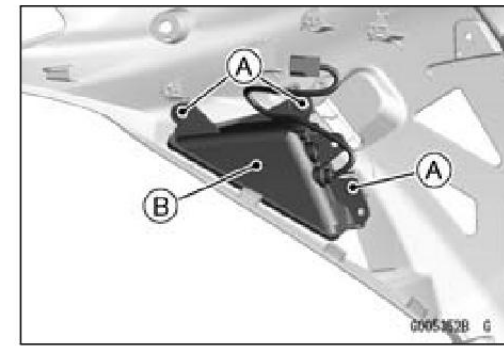
- Remove:
  Screws [A]
  Canister [B] and Purge Valve (Equipped Models)
  Clamp [C]




- Remove:
  Screws [A]
- Pull the inner cover [B] to clear the hooks [C], and remove the inner cover.




- Remove:
  Screws [A]
  Front Right Turn Signal Light [B]

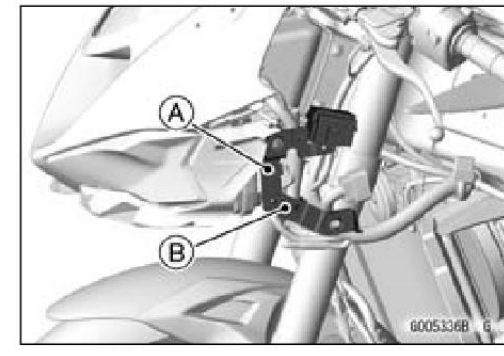



### *Middle Inner Fairing Assembly*

- Assembly is the reverse of disassembly.

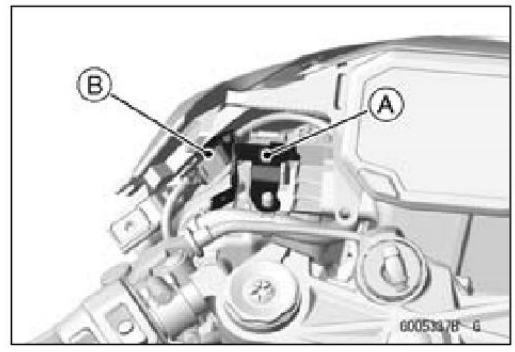
### *Upper Fairing Removal*

- Remove:
  Rear View Mirrors (see Rear View Mirror Removal(15-33))
  Windshield (see Windshield Removal(15-30))
  Middle Inner Fairings (see Middle Inner Fairing Removal(15-12))
  Bolt [A]
- Remove the bracket [B] from the headlight unit.

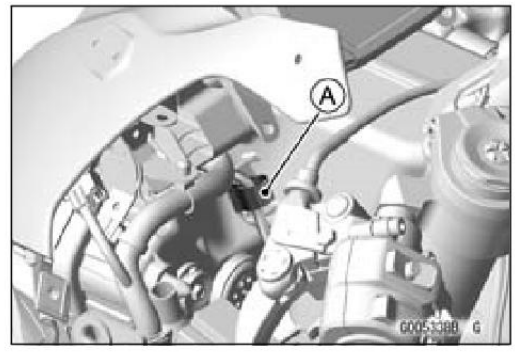


## Fairings

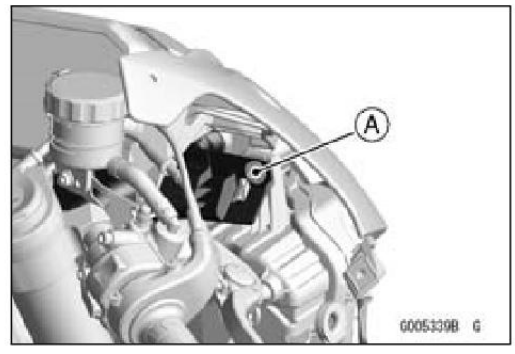
- Remove:
  Bolt [A]
- Disconnect:
  Headlight Unit Connector [B]



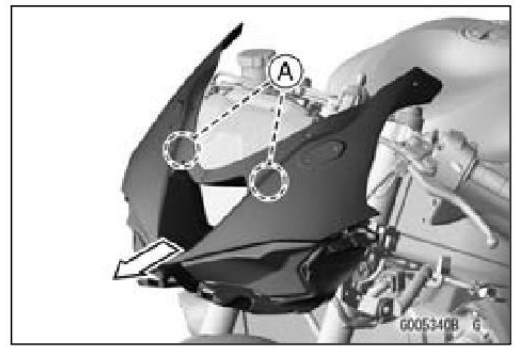

- Open the clamp [A].




- Remove:
  Bolt [A] and Washer

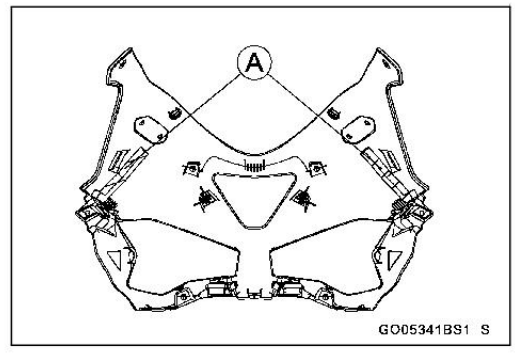



- Pull the upper fairing forward to clear the projections [A].
- Remove the upper fairing.



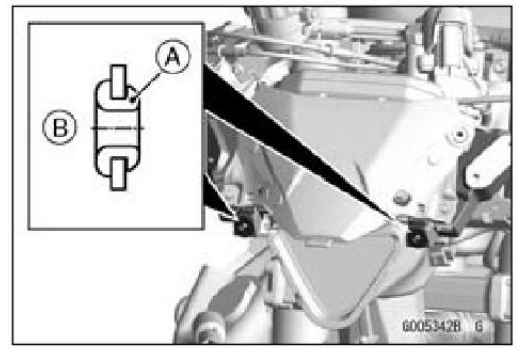

### *Upper Fairing Installation*

- Installation is the reverse of removal.
- Check that the pads [A] is in place on the upper fairing.



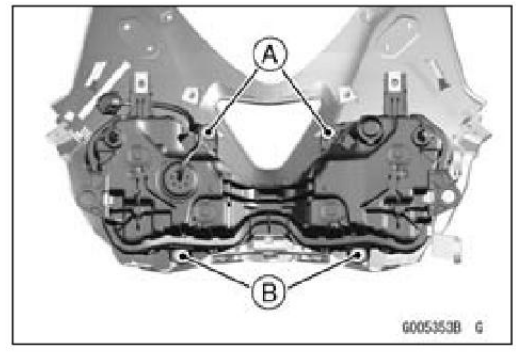
## Fairings

- Check that the grommets [A] are in place on the meter bracket.
  Front Side [B]



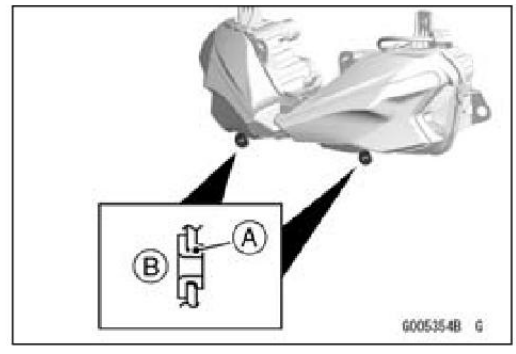

### *Upper Fairing Disassembly*

- Remove:
  Screws [A]
- Pull the headlight unit to clear the projections [B].



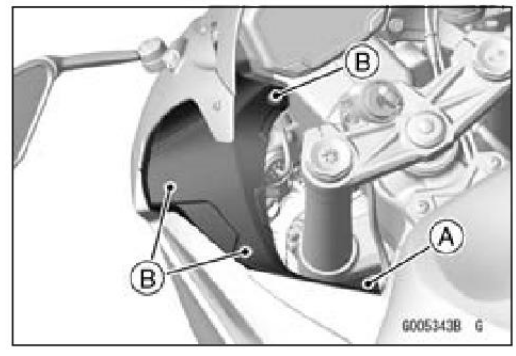

### *Upper Fairing Assembly*

- Assembly is the reverse of disassembly.
- Check that the grommets [A] are in place on the headlight unit.
  Front Side [B]



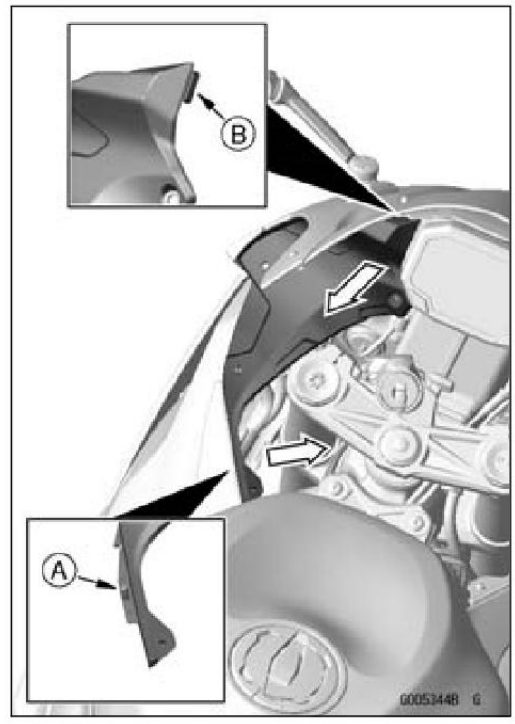

### *Upper Inner Fairing Removal*

- Remove:
  Bolt [A]
  Quick Rivets [B]



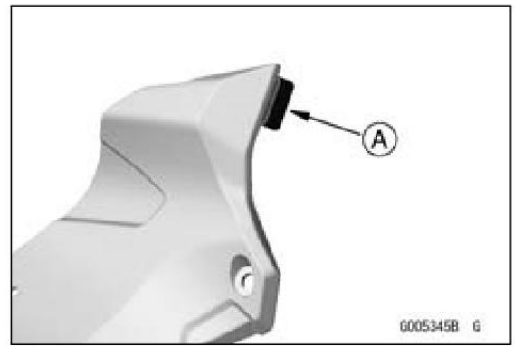
## Fairings

- Pull the rear part of the upper inner fairing inward to clear the tab [A].
- Pull the upper inner fairing rearward to clear the tab [B].
- Remove the upper inner fairing.



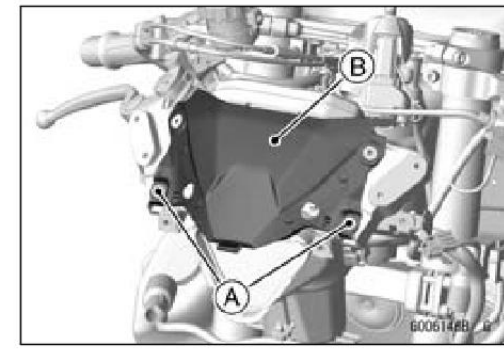

### *Upper Inner Fairing Installation*

- Installation is the reverse of removal.
- Check that the damper [A] is in place on the tab of upper inner fairing.
- Insert the tab into the meter bracket.



## Covers

### *Meter Cover Removal*

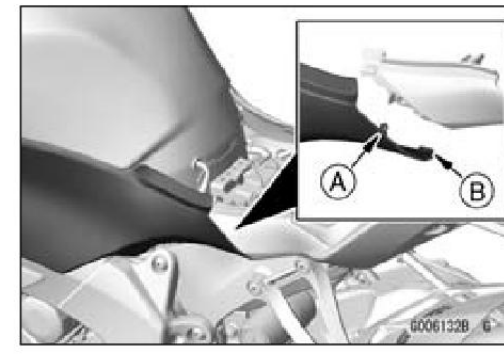



- Remove:
  Upper Fairing (see Upper Fairing Removal(15-15))
  Bolts [A]
  Meter Cover [B]

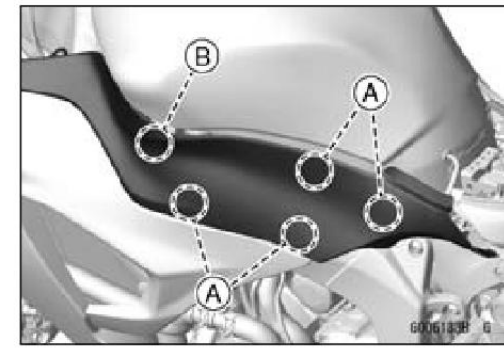
### *Meter Cover Installation*

- Installation is the reverse of removal.

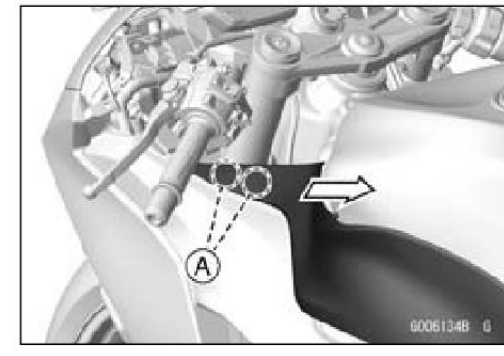
### *Side Cover Removal*




- Remove:
  Front Seat (see Front Seat Removal(15-8))
  Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
- Pull the side cover outward to clear the projection [A] and hook [B].




- Pull the side cover outward to clear the hook fasteners [A] and projection [B].



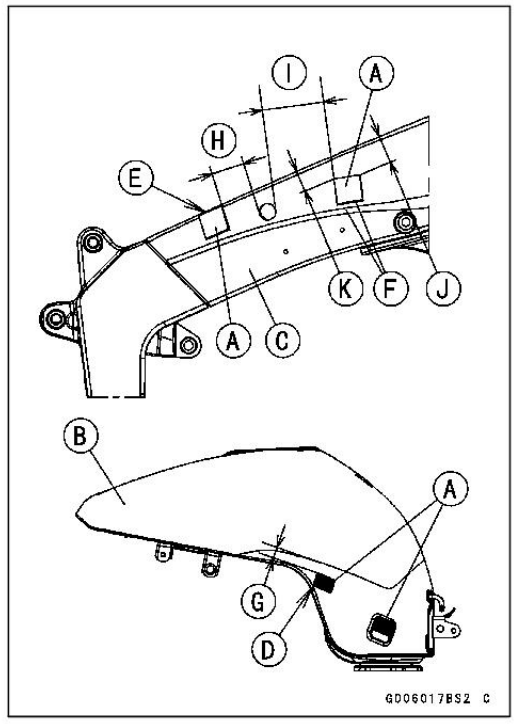

- Pull the side cover rearward to clear the hooks [A], and remove the side cover.

## Covers

### *Side Cover Installation*

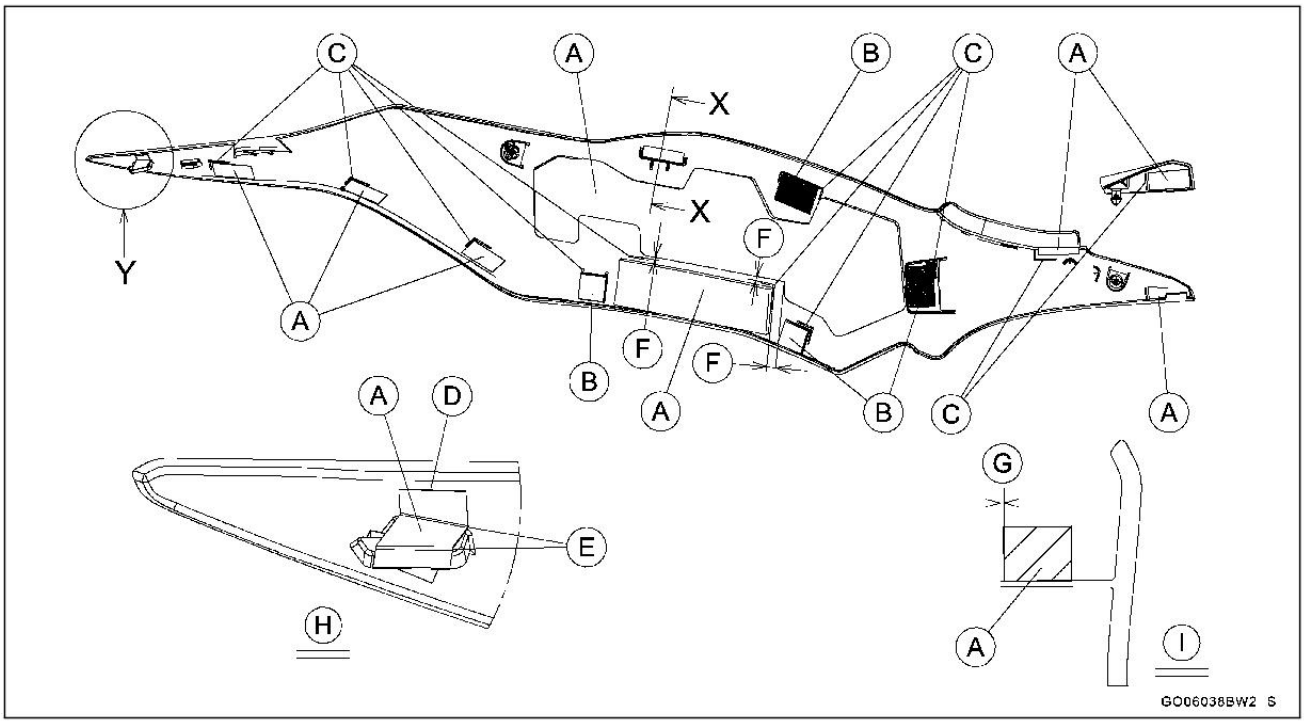
- Installation is the reverse of removal.
- Check that the hook fasteners [A] are in place on the fuel tank [B] and frame [C].

○Fit the hook fastener to the corner [D] on the fuel tank.
○Fit the hook fastener to the corner [E] on the frame.
○Set the hook fastener parallel to the line [F] on the frame.
16 mm (0.6 in.) [G]
40 mm (1.6 in.) [H]
73 mm (2.9 in.) [I]
35 mm (1.4 in.) [J]
27 mm (1.1 in.) [K]



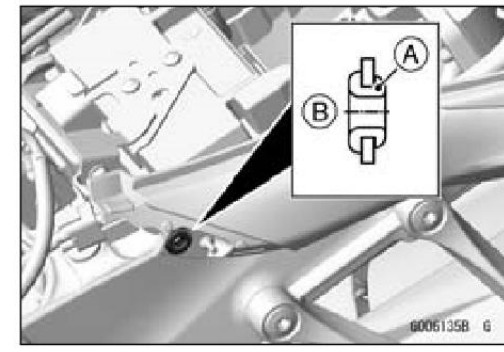

- Check that the pads [A] and hook fasteners [B] are in place on the side cover.

○Set the pad and hook fasteners to the lines [C] on the side cover.
○Fit the pad to the rim end [D].
○Fit the pad to the corner [E] on the rib.
3 – 8 mm (0.08 – 0.31 in.) [F]
1 mm (0.04 in.) [G]
Detail Y [H]
Section X – X [I]

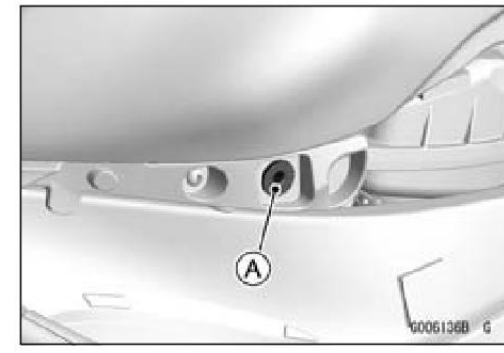


## Covers

● Check the grommet [A] is in place on the seat cover.
Outside [B]

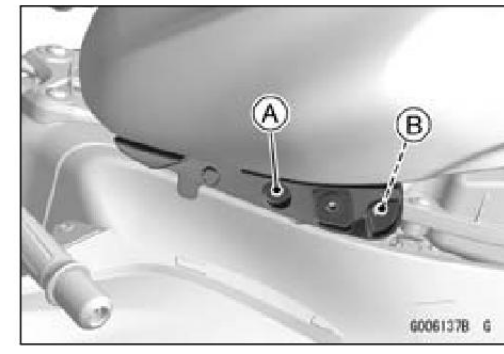



● Check the grommet [A] is in place on the tank cover.



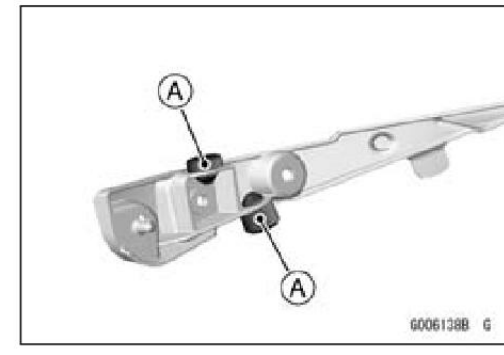

### *Tank Cover Removal*

● Remove:
Side Cover (see Side Cover Removal(15-19))
Bolt [A]
● Clear the projection [B] outward, and remove the tank cover.

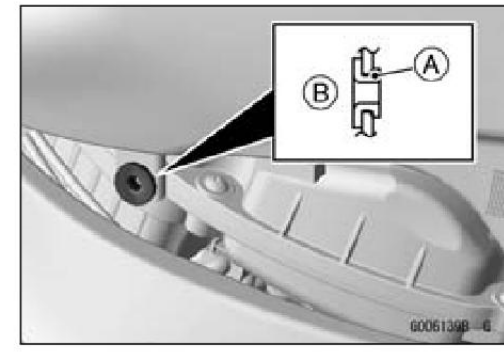



### *Tank Cover Installation*

● Installation is the reverse of removal.
● Check that the dampers [A] are in place on the tank cover.



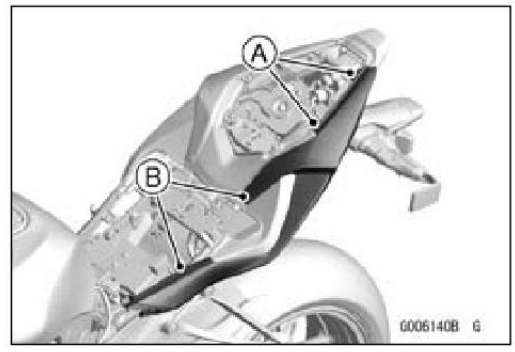

● Check that the grommet [A] is in place on the fuel tank.
Outside [B]



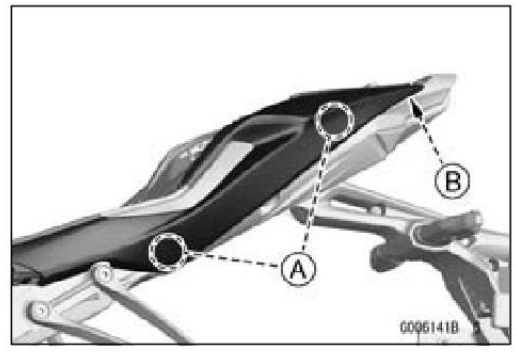
## Covers

### *Seat Cover Removal*

- Remove:
  Rear Seat (see Rear Seat Removal(15-8))
  Side Cover (see Side Cover Removal(15-19))
  Bolts [A] and Washers
  Quick Rivets [B]

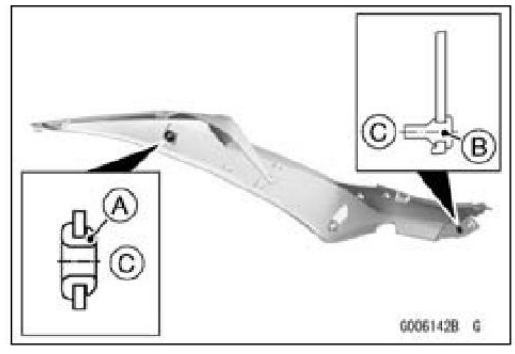



- Pull the seat cover outward to clear the projections [A] and hook [B].
- Remove the seat cover.

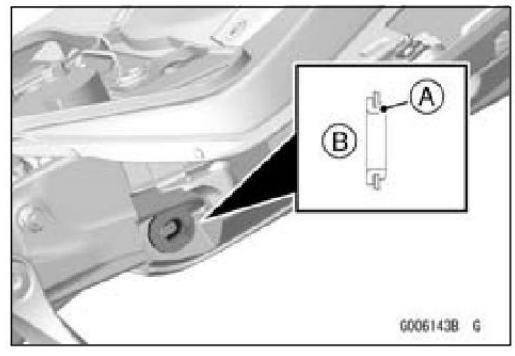



### *Seat Cover Installation*

- Installation is the reverse of removal.
- Check that the grommet [A] and damper [B] are in place on the seat cover.
  Outside [C]

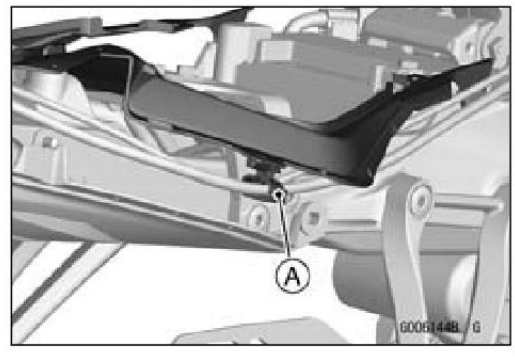



- Check that the grommet [A] is in place on the rear fender.
  Outside [B]



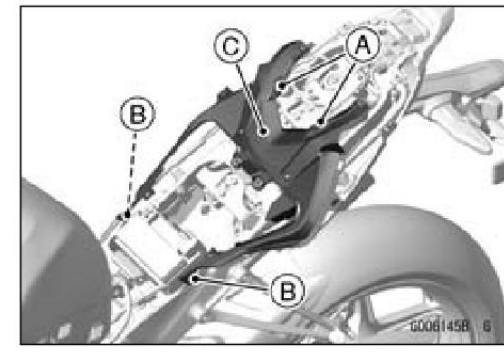

### *Center Seat Cover Removal*

- Remove:
  Seat Covers (see Seat Cover Removal(15-22))
- Open the clamp [A].



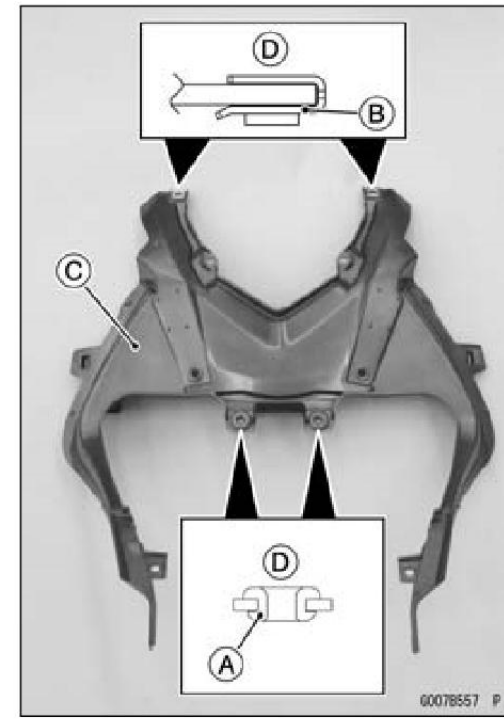
## Covers

- Remove:
  Bolts [A]
  Rivets [B]
  Center Seat Cover [C]



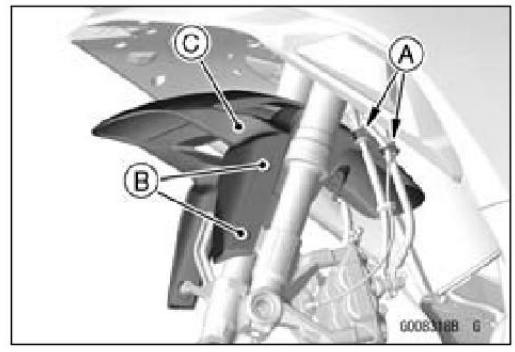

### *Center Seat Cover Installation*

- Installation is the reverse of removal.
- Check that the grommets [A] and clip nuts [B] are in place on the center seat cover [C].
  Upside [D]



## Fenders

### *Front Fender Removal*

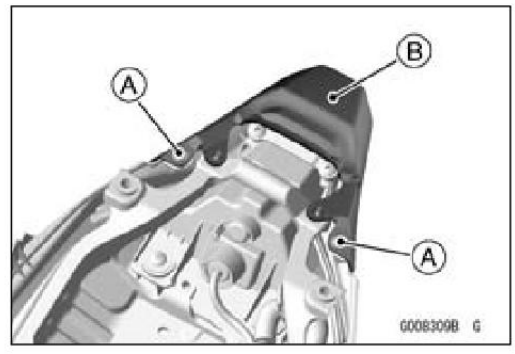



- Remove:
  Front Wheel (see Front Wheel Removal(10-6))
- Clear the brake hoses and wheel rotation sensor lead from the clamps [A] (both sides).
- Remove:
  Bolts [B] and Washers (Both Sides)
  Front Fender [C]

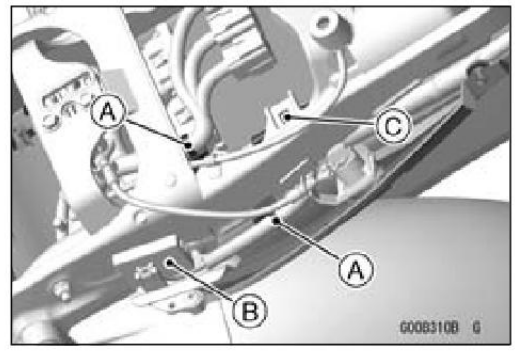
### *Front Fender Installation*

- Installation is the reverse of removal.

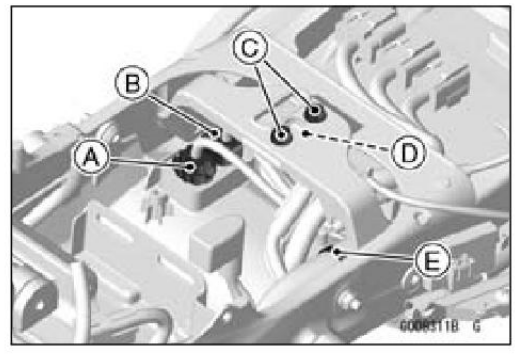
### *Rear Fender Removal*




- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Battery (see Battery Removal(16-24))
  Center Seat Cover (see Center Seat Cover Removal(15-22))
  Flap (see Flap Removal(15-26))
  Relay Box (see Relay Box Removal(16-101))
  ECU (see ECU Removal(3-12))
  Screws [A]
  Brake/Tail Light Cover [B]



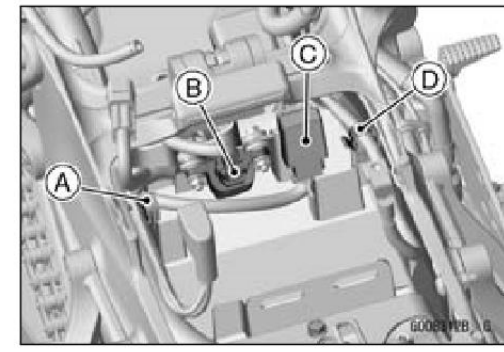

- Open the clamps [A].
- Clear the fuse box [B] from the bracket.
- Clear the brake/tail light connector [C] from the rear frame rear.
- Disconnect:
  Brake/Tail Light Connector



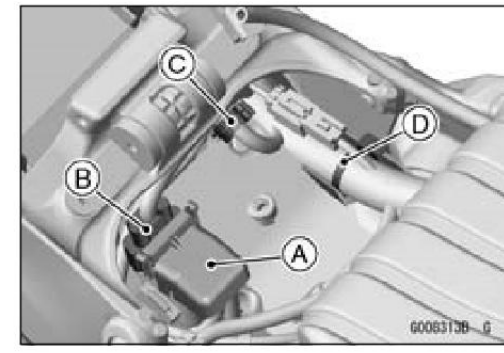

- Clear the immobilizer/kawasaki diagnostic system connector [A] and ABS kawasaki diagnosis system connector [B] from the rear fender.
- Remove:
  Bolts [C]
  Bracket [D]
- Open the clamp [E].

## Fenders

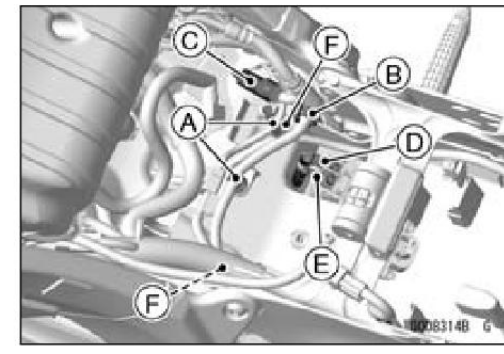
- Open the clamp [A].
- Disconnect:
  Vehicle-down Sensor Connector [B]
- Clear the turn signal relay [C] from the rear fender.
- Clear the negative (–) cable from the clamp [D].



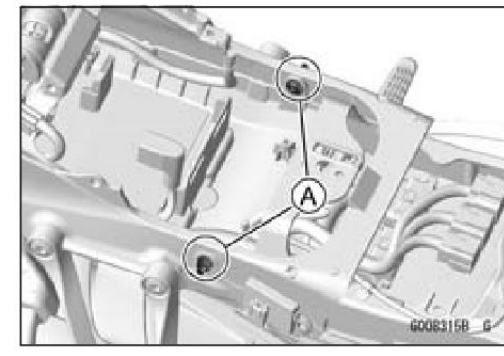

- Remove:
  Starter Relay Cover [A]
- Disconnect:
  Starter Relay Connector [B]
- Clear the vehicle-down sensor lead from the clamp [C].
- Open the clamp [D].




- Open the clamps [A].
- Clear the rear wheel rotation sensor lead from the clamp [B].
- Disconnect:
  Rear Wheel Rotation Sensor Connector [C]
  Battery Positive (+) Cable [D]
  Starter Motor Cable [E]
- Remove:
  Bolts [F]




- Remove:
  Bolts [A] and Nuts
- Remove the rear fender backward.

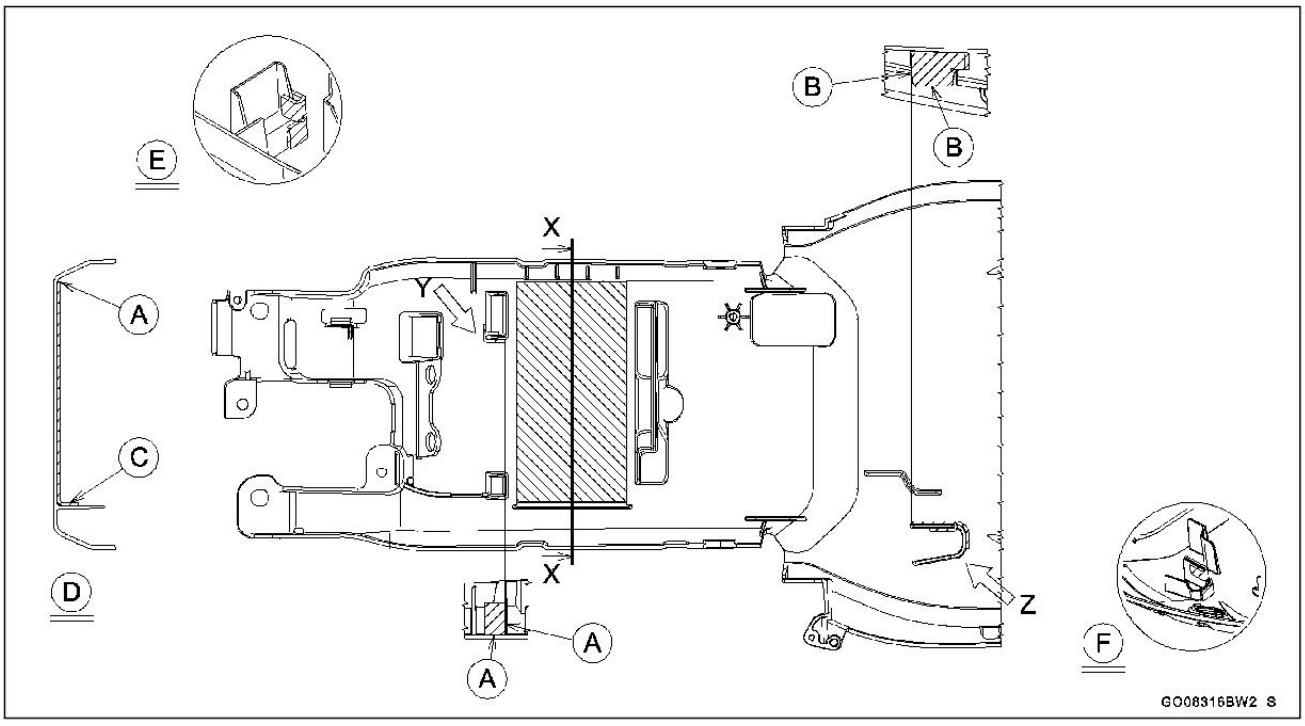


## Fenders

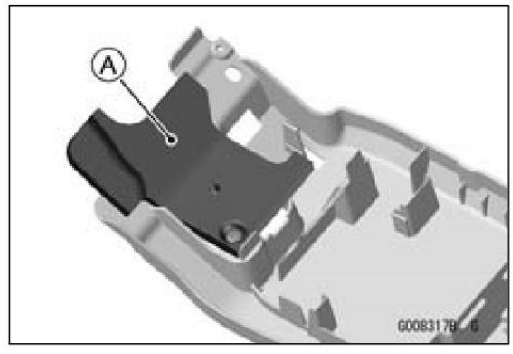
### *Rear Fender Installation*

- Installation is the reverse of removal.
- Check that the pads in place on the rear fender.

○Align the pad to the corner [A].
○Align the pad to the edge [B].
○Fit the pad so that extent to the wall [C] at left side.
Section X – X [D]
Viewed from Y [E]
Viewed from Z [F]

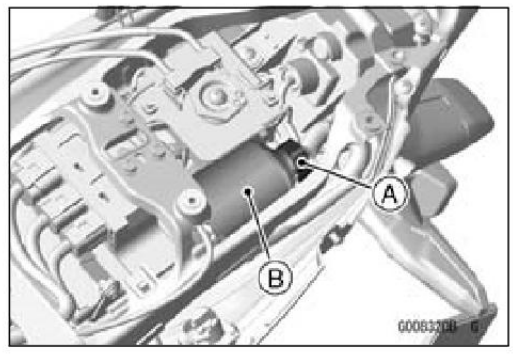



- Check that the pad [A] in place on the rear fender.



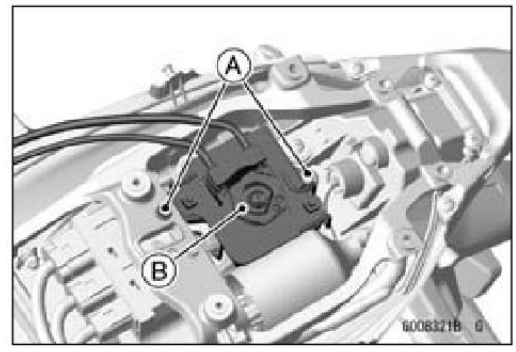

### *Flap Removal*

- Remove:
Center Seat Cover (see Center Seat Cover Removal(15-22))
- Open the clamp [A].
- Slide the dust cover [B].
- Disconnect:
Rear Turn Signal Light Connectors
License Plate Light Connector
Exhaust Butterfly Valve Actuator Connectors (Equipped Models)

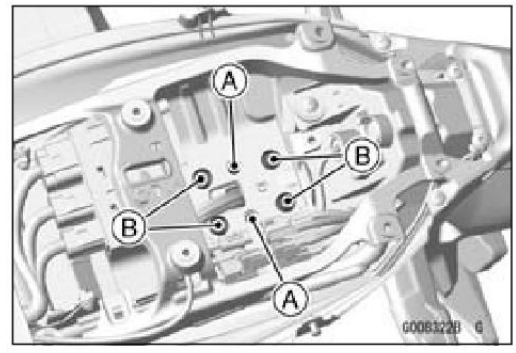


## Fenders

- For exhaust butterfly valve equipped models, remove the bolts [A].
- Bring the exhaust butterfly valve actuator [B] aside away from the rear frame.

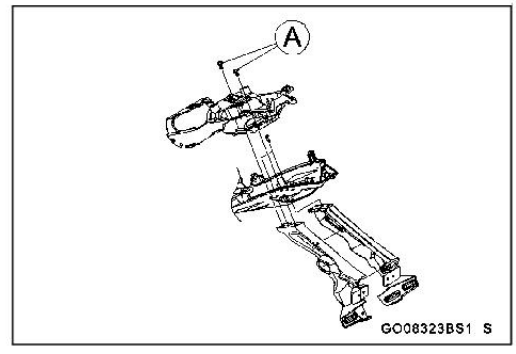



- Remove:
  Screws [A]
  Flap Bolts [B]
  Flap



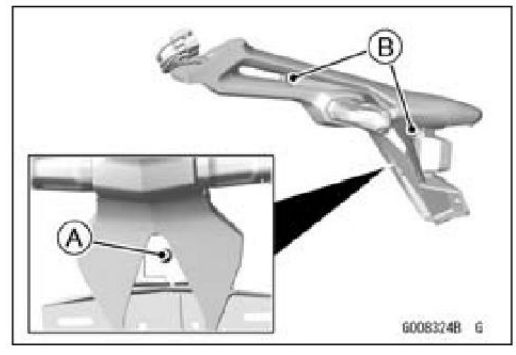

### *Flap Installation*

- Installation is the reverse of removal.
- Replace the flap bolts [A] with new ones.
- Run the leads and cables correctly (see Cable, Wire, and Hose Routing section (18-2)).

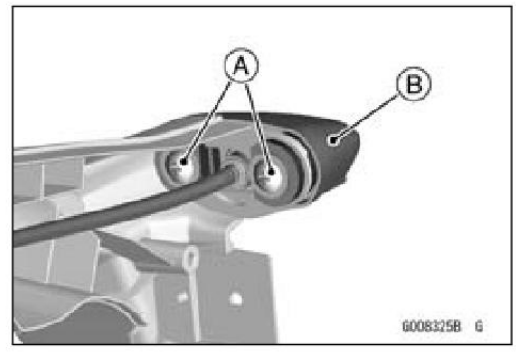



### *Flap Disassembly*

- Remove:
  Flap (see Flap Removal(15-26))
  Reflector Nut [A]
- Remove the screws [B] to separate the flap.

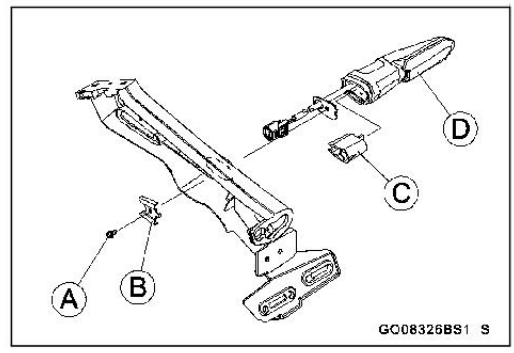



- Remove:
  Screws [A] and Washers
  License Plate Light [B]
  Dampers



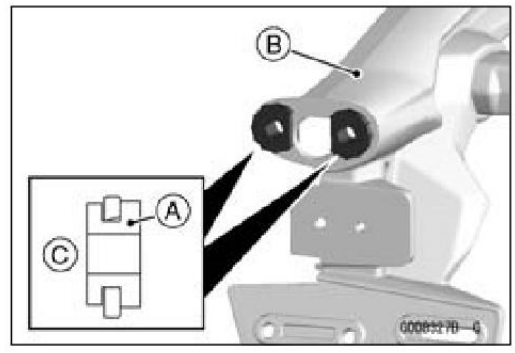
## Fenders

● Remove:
Screw [A]
Washer [B]
Plug [C]
Rear Turn Signal Light [D]

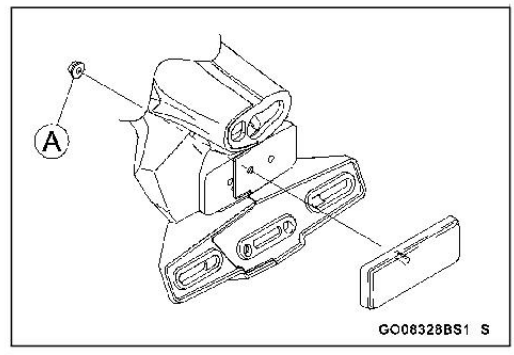



### *Flap Assembly*

● Assembly is the reverse of disassembly.
● Install the dampers [A] to the flap [B] as shown.
○Install the damper with its paint mark facing forward [C].

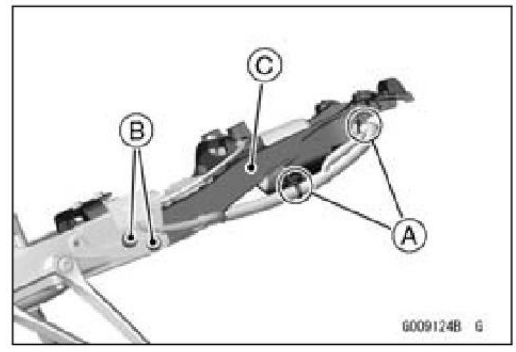



● Replace the reflector nut [A] with a new one.



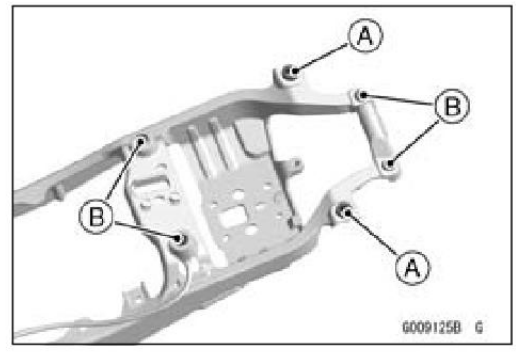
## Frame

### *Rear Frame Rear Removal*




- Remove:
  Rear Fender (see Rear Fender Removal(15-24))
- Open the clamps [A].
- Remove:
  Rear Frame Bolts (M8) [B] (Both Sides)
  Rear Frame Rear [C]

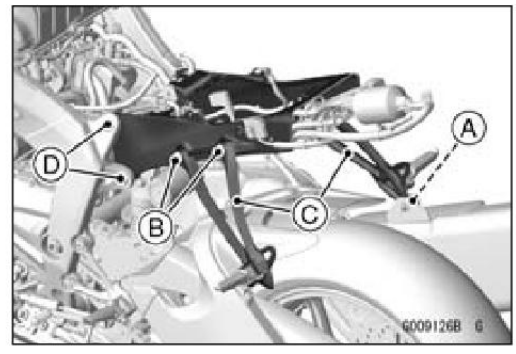
### *Rear Frame Rear Installation*




- Installation is the reverse of removal.
- Check that the dampers [A] and the wellnuts [B] are in place on the rear frame rear.
- Replace the rear frame bolts (M8) with new ones.
- Tighten:

**Torque - Rear Frame Bolts (M8): 25 N·m (2.5 kgf·m, 18 ft·lb)**

### *Rear Frame Front Removal*




- Remove:
  Rear Frame Rear (see Rear Frame Rear Removal(15-29))
  Muffler Body Bolt [A], Washers and Nut
  Rear Footpeg Bracket Bolts [B] (Both Sides)
  Rear Footpeg Brackets [C]
  Rear Frame Bolts (M10) [D] (Both Sides)
  Rear Frame Front

### *Rear Frame Front Installation*

- Installation is the reverse of removal.
- Replace the rear frame bolts (M10) with new one.
- Tighten:

**Torque - Rear Frame Bolts (M10): 45 N·m (4.6 kgf·m, 33 ft·lb)**
**Rear Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)**
**Muffler Body Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)**

### *Frame Inspection*

- Visually inspect the frame for cracks, dents, bending, or warp.

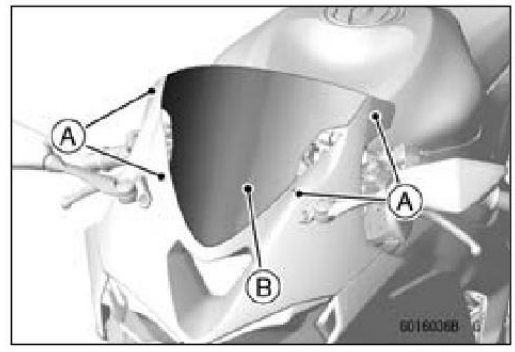
★If there is any damage to the frame, replace it.

**⚠ WARNING**

**A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.**

## Windshield

### *Windshield Removal*



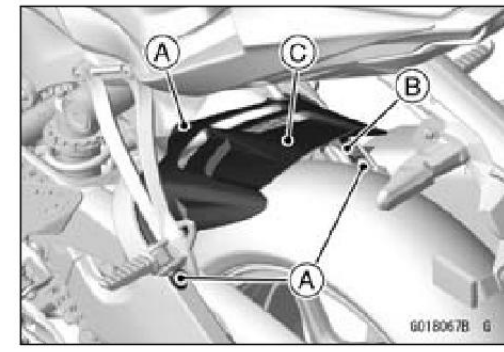

- Remove:
  Bolts [A] and Washers
  Windshield [B]

### *Windshield Installation*

- Installation is the reverse of removal.

## Guard

### *Mud Guard Removal*




- Remove:
  Mud Guard Bolts [A]
  Brake Hose Clamp [B]
  Mud Guard [C]

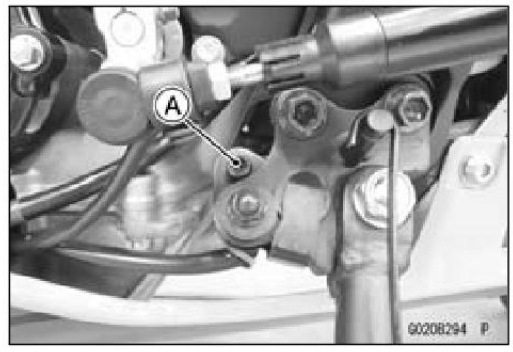
### *Mud Guard Installation*

- Installation is the reverse of removal.
- Replace the mud guard bolts with new ones.

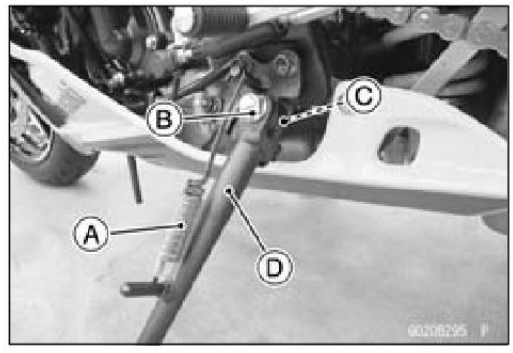
## Side Stand

### *Side Stand Removal*

- Raise the rear wheel off the ground with the stand.
- Remove:
  Side Stand Switch Bolt [A]
  Side Stand Switch




- Remove:
  Spring [A]
  Side Stand Nut [B]
  Side Stand Bolt [C]
  Side Stand [D]




### *Side stand Installation*

- Apply grease to the sliding area [A] of the side stand [B].
- Replace:
  Side Stand Nut [C]
  Side Stand Switch Bolt [D]
- Tighten the side stand bolt [E], and then lock it with the side stand nut.

**Torque - Side Stand Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)**
**Side Stand Nut: 45 N·m (4.6 kgf·m, 33 ft·lb)**

- Hook the spring [F] so that the long spring end faces upward.

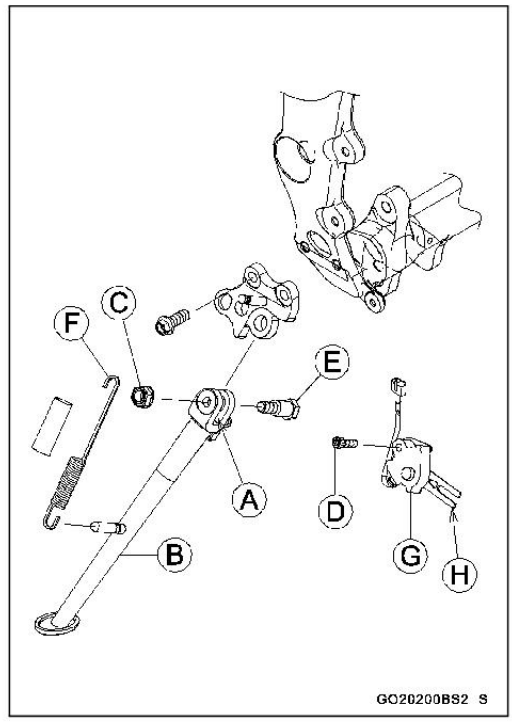
○Install the spring hook direction as shown.

- Install the side stand switch [G].

○Insert the side stand switch arm [H] to the pin on the side stand.

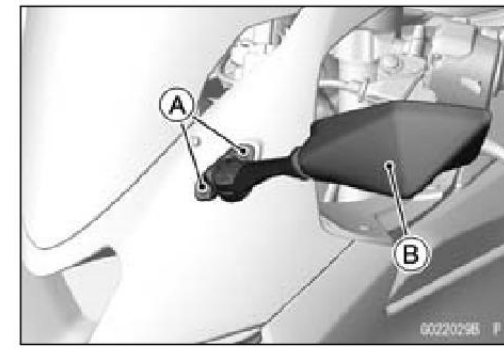
- Tighten:

**Torque - Side Stand Switch Bolt: 9.0 N·m (0.92 kgf·m, 80 in·lb)**



## Rear View Mirrors

### *Rear View Mirror Removal*




- Remove:
  Bolts [A]
  Rear View Mirror [B]

### *Rear View Mirror Installation*

- Installation is the reverse of removal.

# Electrical System

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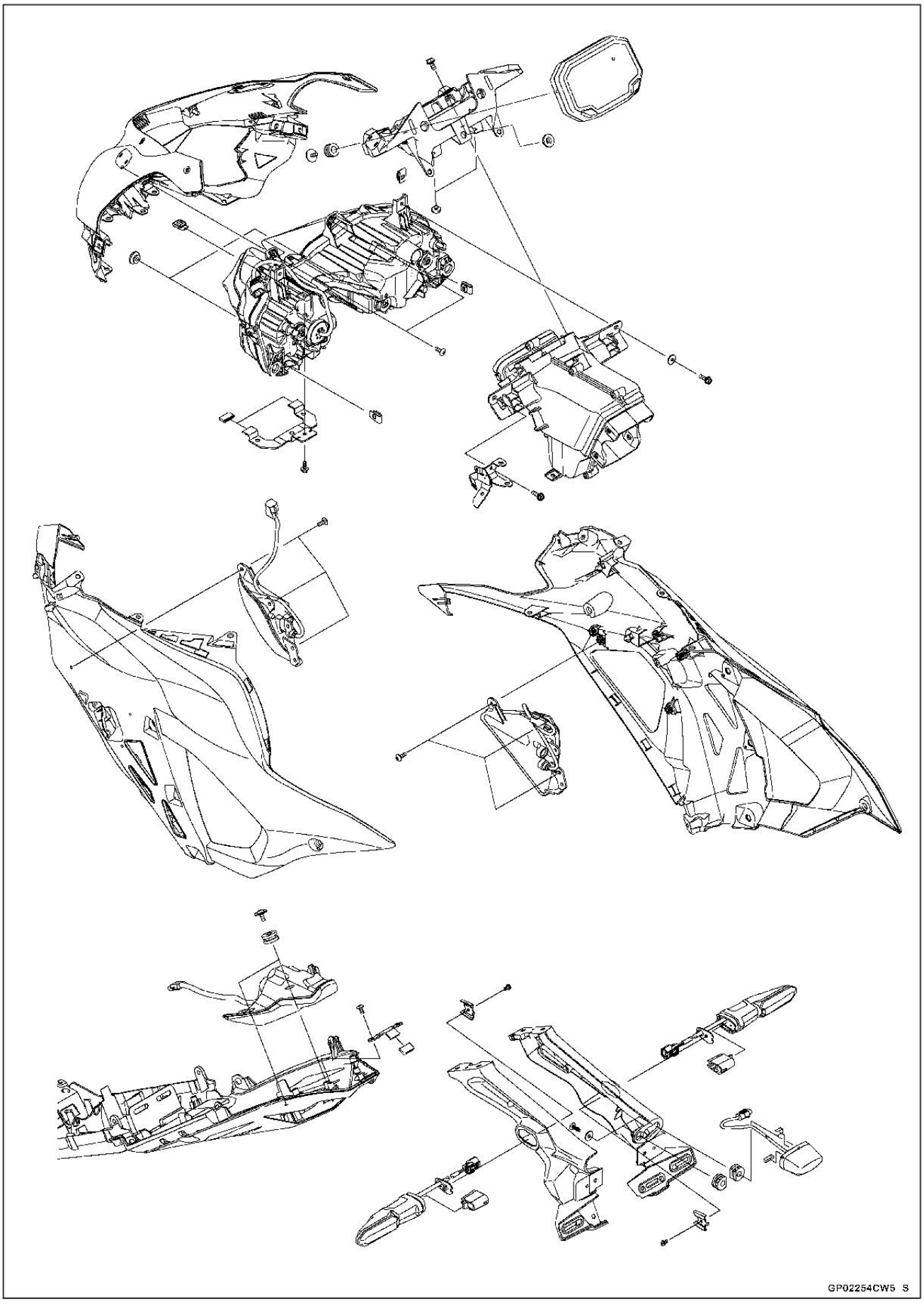
## Exploded View



## Exploded View

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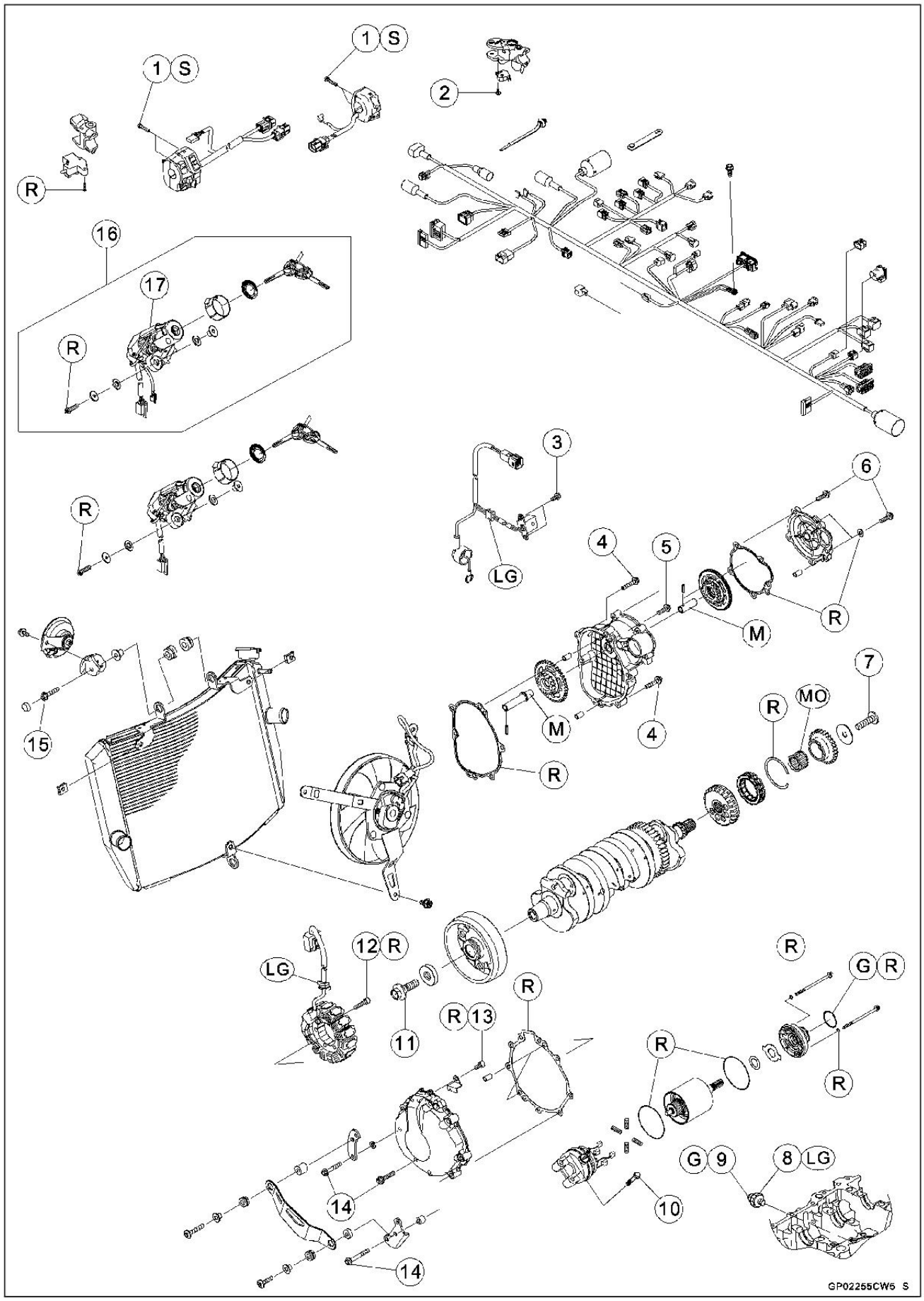
## Exploded View



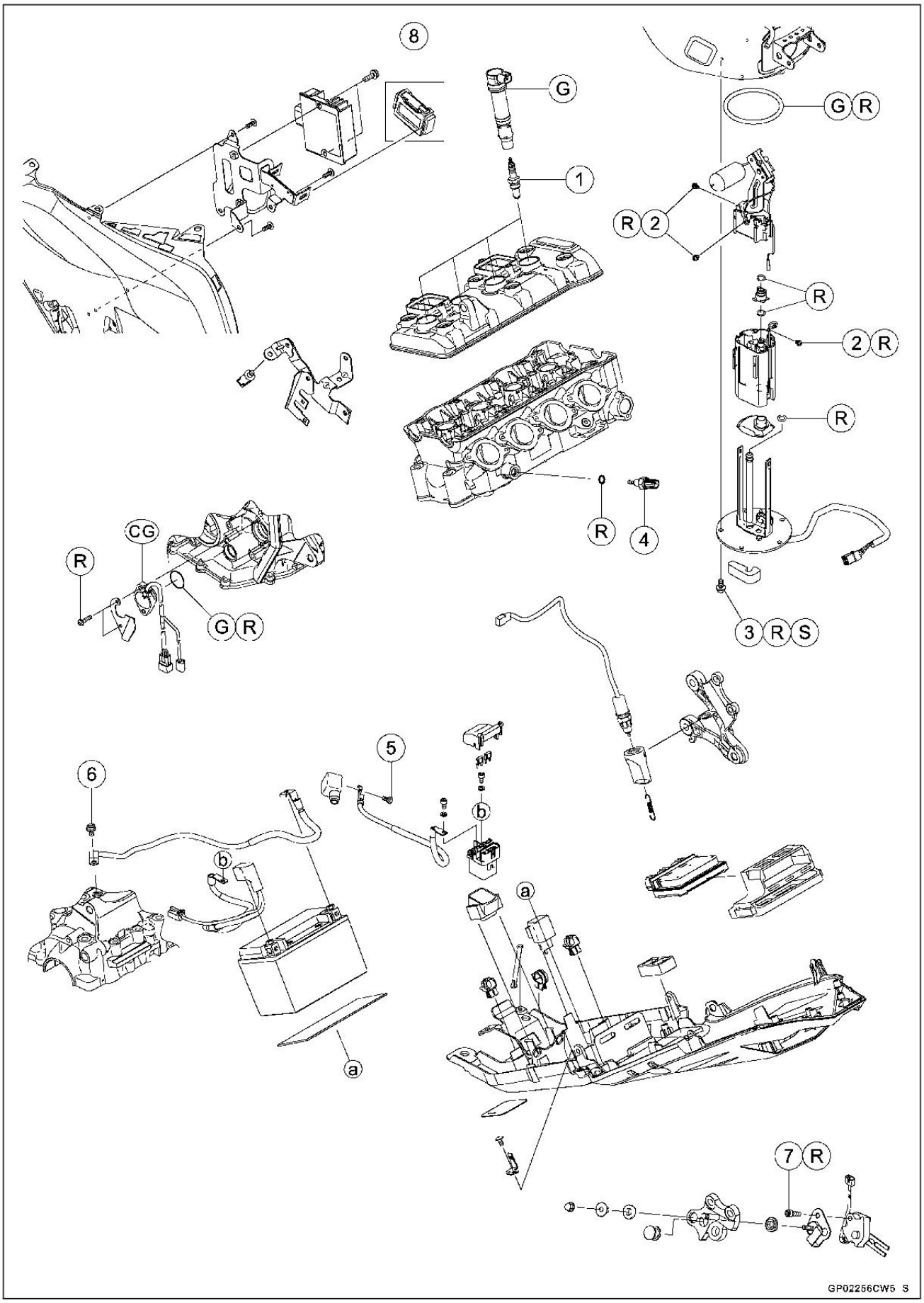
## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Switch Housing Screws | 2.4 | 0.24 | 21 in·lb | S |
| 2 | Front Brake Light Switch Screw | 1.2 | 0.12 | 11 in·lb | |
| 3 | Crankshaft Sensor Bolts | 6.0 | 0.61 | 53 in·lb | |
| 4 | Starter Motor Clutch Cover Bolt (L = 30 mm) | 10 | 1.0 | 89 in·lb | |
| 5 | Starter Motor Clutch Cover Bolt (L = 20 mm) | 10 | 1.0 | 89 in·lb | |
| 6 | Idle Gear Cover Bolts | 10 | 1.0 | 89 in·lb | |
| 7 | Starter Motor Clutch Bolt | 49 | 5.0 | 36 | |
| 8 | Oil Pressure Switch | 15 | 1.5 | 11 | LG |
| 9 | Oil Pressure Switch Terminal Bolt | 2.0 | 0.20 | 18 in·lb | G |
| 10 | Starter Motor Mounting Bolts | 10 | 1.0 | 89 in·lb | |
| 11 | Alternator Rotor Bolt | 155 | 15.8 | 114 | |
| 12 | Stator Coil Bolts | 12 | 1.2 | 106 in·lb | R |
| 13 | Alternator Lead Holding Plate Bolt | 10 | 1.0 | 89 in·lb | R |
| 14 | Alternator Cover Bolts | 10 | 1.0 | 89 in·lb | |
| 15 | Radiator Bolt (Upper) | 10 | 1.0 | 89 in·lb | |

16. Immobilizer System Equipped Models
17. Immobilizer Antenna

G: Apply grease.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts

## Exploded View



## Exploded View

| No. | Fastener | Torque | | | Remarks |
|---|---|---|---|---|---|
| | | N·m | kgf·m | ft·lb | |
| 1 | Spark Plugs | 13 | 1.3 | 115 in·lb | |
| 2 | Fuel Pump Assembly Screws | 0.98 | 0.10 | 8.7 in·lb | R |
| 3 | Fuel Pump Bolts | 10 | 1.0 | 89 in·lb | R, S |
| 4 | Water Temperature Sensor | 12 | 1.2 | 106 in·lb | |
| 5 | Starter Motor Cable Terminal Bolt | 3.0 | 0.31 | 27 in·lb | |
| 6 | Engine Ground Terminal Bolt | 10 | 1.0 | 89 in·lb | |
| 7 | Side Stand Switch Bolt | 9.0 | 0.92 | 80 in·lb | R |

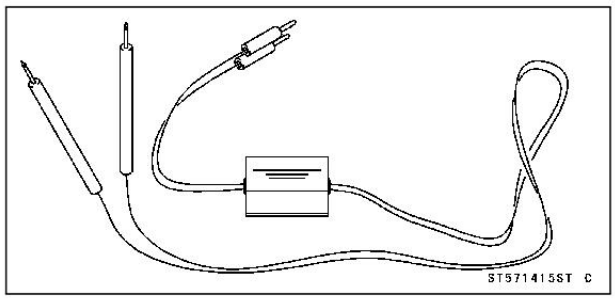
8. Immobilizer System Equipped Models
CG: Apply electrical contact grease (High-temperature diurea grease).
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

## Specifications

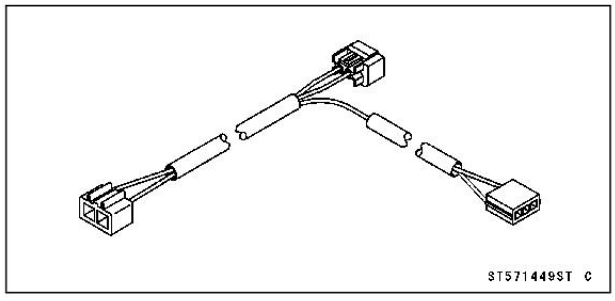
| Item | Standard |
|---|---|
| **Battery** | |
| Type | Sealed Battery |
| Model Name | YTX9-BS |
| Capacity | 12 V 8 Ah (10 HR) |
| Voltage | 12.8 V or more |
| Gross Weight | 3.1 kg (6.8 lb) |
| Electrolyte Volume | 0.40 L (24 cu in.) |
| **Charging System** | |
| Alternator Type | Three-phase AC |
| Charging Voltage (Regulator/Rectifier Output Voltage) | 14.3 – 14.7 V @25°C (77°F) |
| Alternator Output Voltage | 37.6 – 56.4 V @4 000 r/min (rpm) |
| Stator Coil Resistance | 0.106 – 0.160 Ω @20°C (68°F) |
| **Ignition System** | |
| Crankshaft Sensor: | |
| Resistance | 368 – 552 Ω @20°C (68°F) |
| Peak Voltage | 3.8 V or more |
| Stick Coil: | |
| Primary Winding Resistance | 0.85 – 1.15 Ω @20°C (68°F) |
| Secondary Winding Resistance | 6.7 – 9.1 kΩ @20°C (68°F) |
| Primary Peak Voltage | 120 V or more |
| Spark Plug: | |
| Type | NGK CR9E |
| Gap | 0.7 – 0.8 mm (0.028 – 0.031 in.) |
| **Electric Starter System** | |
| Starter Motor: | |
| Brush Length | 7 mm (0.28 in.) (Service Limit: 5 mm (0.20 in.)) |
| Commutator Diameter | 24 mm (0.94 in.) (Service Limit: 23 mm (0.91 in.)) |
| **Air Switching Valve** | |
| Resistance | 20 – 24 Ω @20°C (68°F) |
| **Switches and Sensors** | |
| Rear Brake Light Switch Timing | ON after about 10 mm (0.39 in.) of pedal travel |
| Oil Pressure Switch Connections | When engine is stopped: ON<br>When engine is running: OFF |
| Water Temperature Sensor Resistance: | |
| 40°C (104°F) | 1.041 – 1.231 kΩ |
| 100°C (212°F) | 0.1483 – 0.1623 kΩ |
| Gear Position Switch Resistance | in the text |
| Fuel Level Sensor Resistance: | |
| Full Level Position | 9.6 – 12.4 Ω |
| Empty Level Position | 222 – 228 Ω |

## Special Tools and Sealant

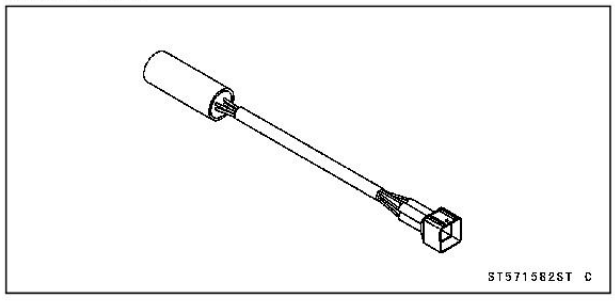
**Peak Voltage Adapter:**
**57001-1415**



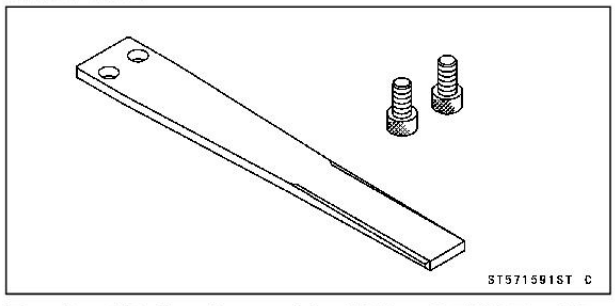

**Lead Wire - Peak Voltage Adapter:**
**57001-1449**



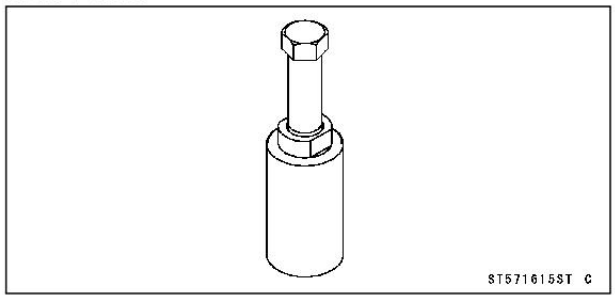

**Key Registration Unit:**
**57001-1582**



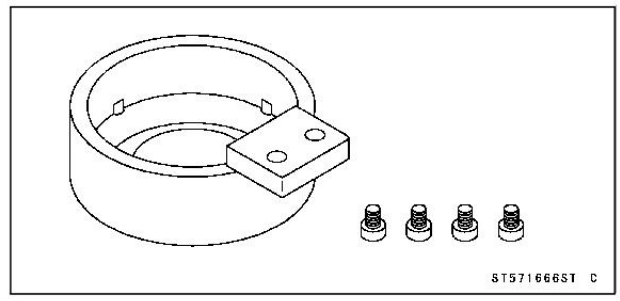

**Grip:**
**57001-1591**



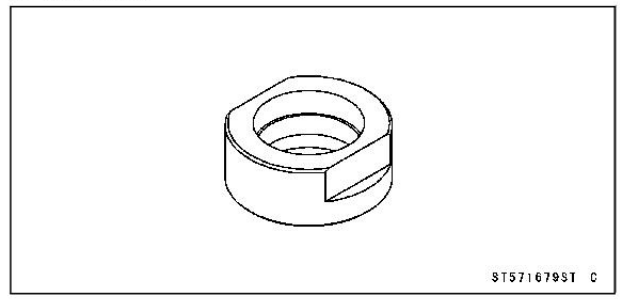

**Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:**
**57001-1615**



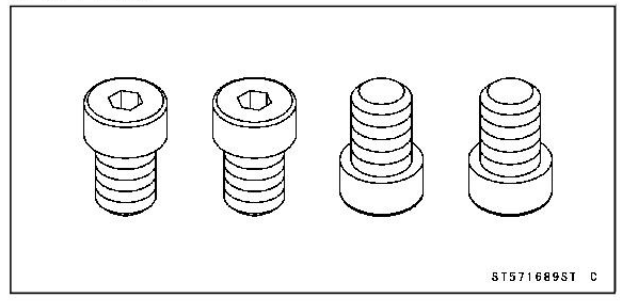

**Rotor Holder:**
**57001-1666**



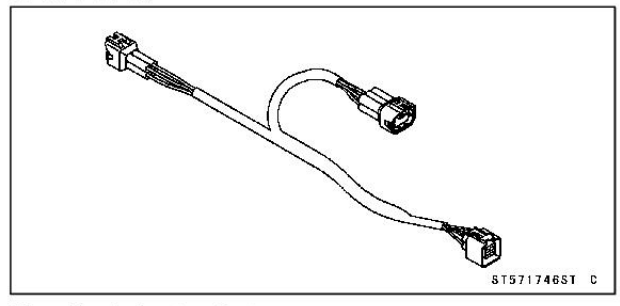

**Stopper:**
**57001-1679**



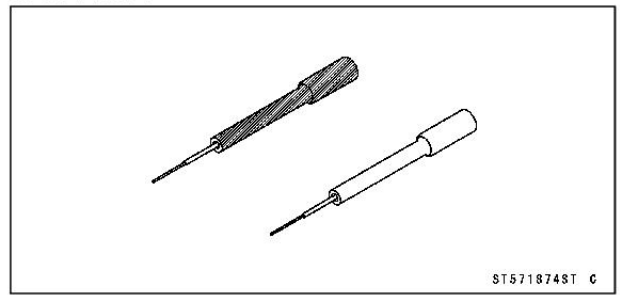

**Rotor Holder Attachment:**
**57001-1689**




**Key Registration Adapter:**
**57001-1746**

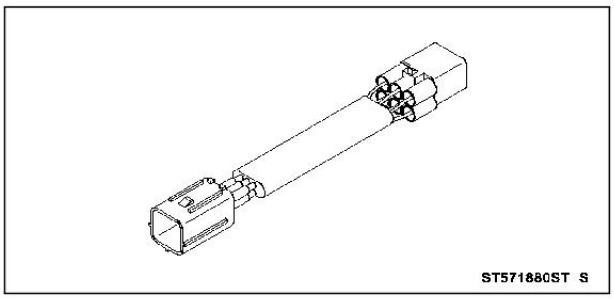



**Needle Adapter Set:**
**57001-1874**

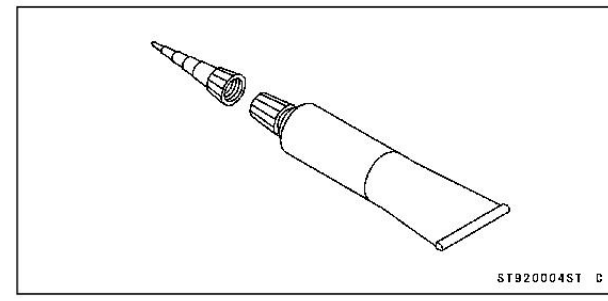


## Special Tools and Sealant

**OBDII Adapter Cable:**
**57001-1880**

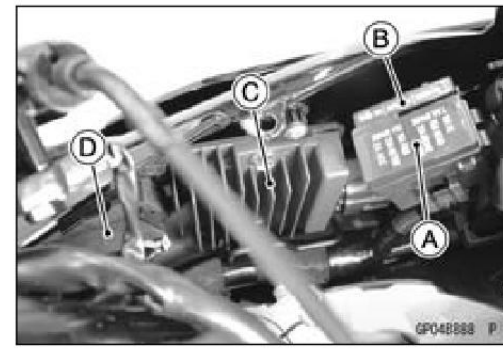



**Liquid Gasket, TB1211F:**
**92104-0004**



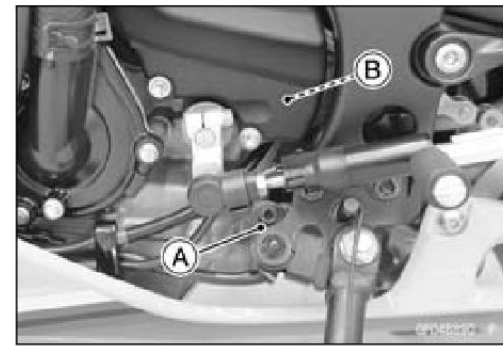
## Parts Location

Fuse Box (1) [A]
Fuse Box (2) [B]
Regulator/Rectifier [C]
Immobilizer Amplifier (Immobilizer Equipped Models) [D]

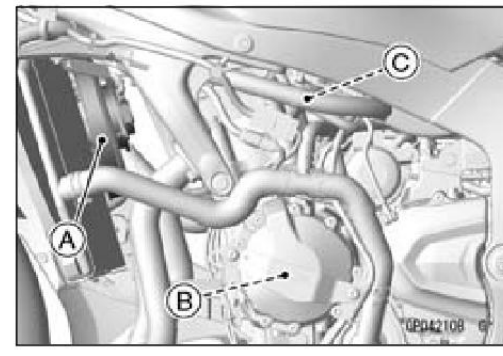



Fuse Box (3) [A]

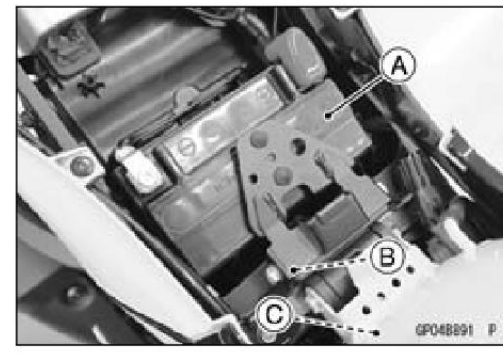
Side Stand Switch [A]
Gear Position Switch [B]




Radiator Fan Motor [A]
Alternator [B]
Water Temperature Sensor [C]

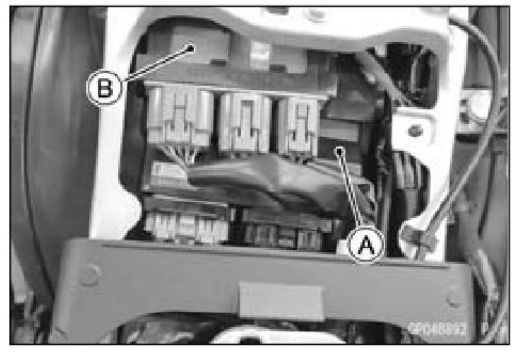



Battery [A]
Turn Signal Relay [B]
Starter Relay [C]

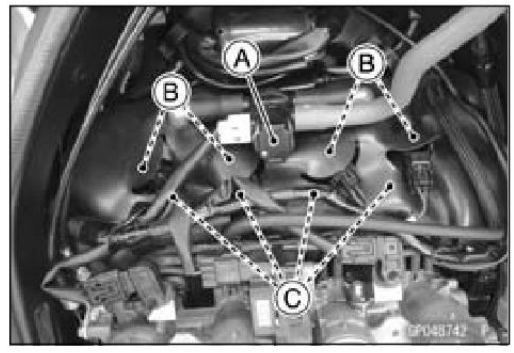


## Parts Location

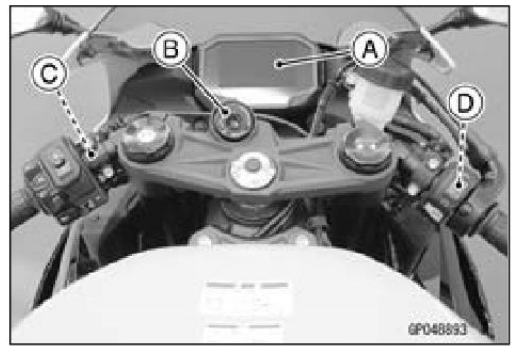
ECU [A]
Relay Box [B]



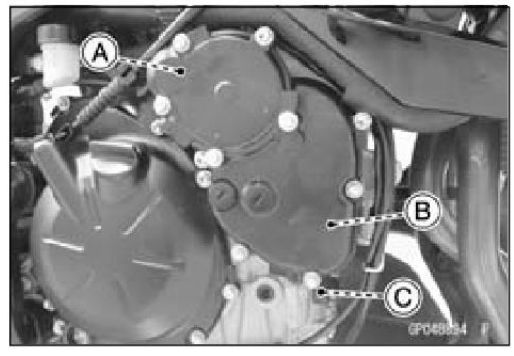

Air Switching Valve [A]
Stick Coils [B]
Spark Plugs [C]



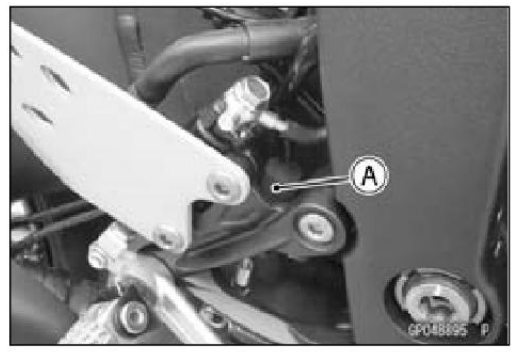

Meter Unit [A]
Ignition Switch (Immobilizer Equipped Models: Including Immobilizer Antenna) [B]
Starter Lockout Switch [C]
Front Brake Light Switch [D]




Starter Motor [A]
Crankshaft Sensor [B]
Oil Pressure Switch [C]

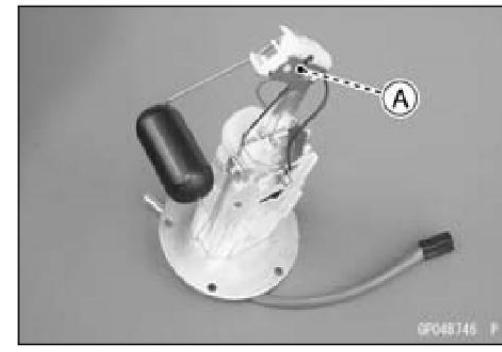



Rear Brake Light Switch [A]

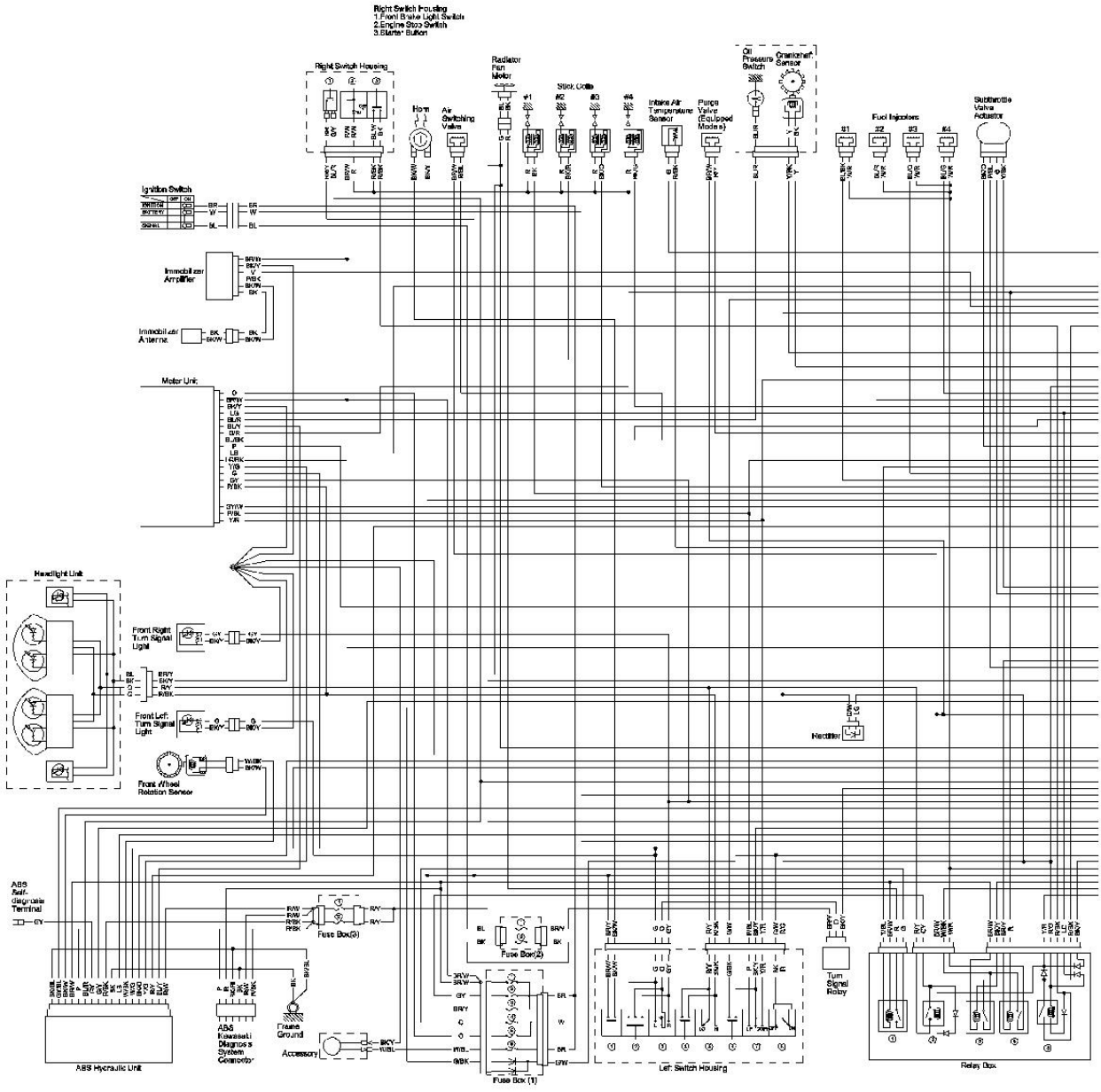


## Parts Location

Fuel Level Sensor [A]



## Wiring Diagram (ZX636J with Immobilizer)




Fuse Box(3)
1.ABS Motor Relay Fuse 25A
2.ABS Solenoid Valve Relay Fuse 16A

Fuse Box(2)
1.Turn Signal Relay Fuse 7.5A
2.Spare Fuse 20A

Fuse Box (1)
1.Ignition Fuse 15A
2.Headlight Fuse 15A
3.Brake Light/Horn Fuse 7.5A
4.Radiator Fan Fuse 15A
5.Meter Fuse 7.5A
6.Accessory Fuse 2A

Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.SEL Button
7.Upper and Lower Button
8.Starter Lockout Switch

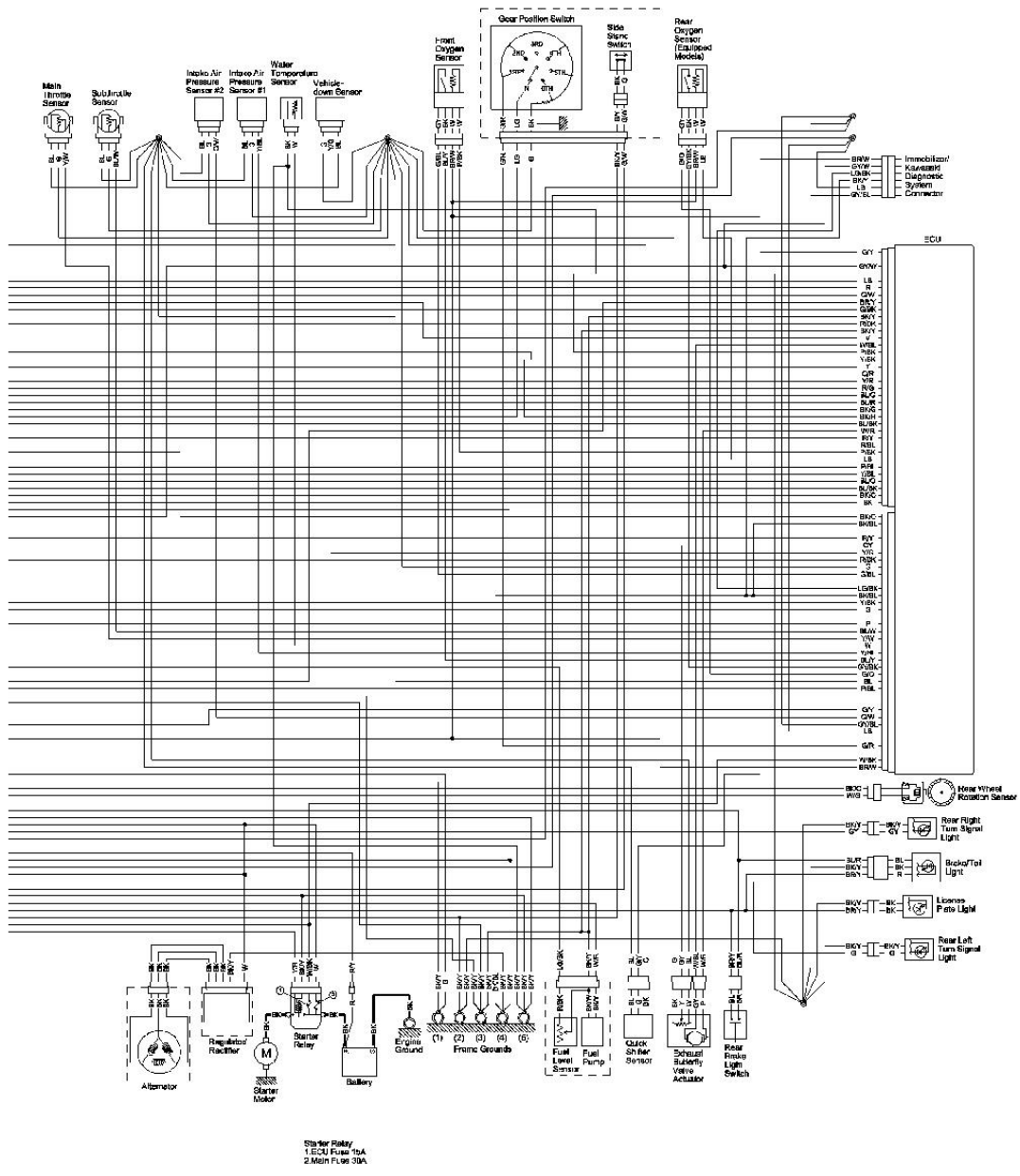
Relay Box
1.Radiator Fan Relay
2.Headlight Circuit Relay
3.ECU Main Relay
4.Fuel Pump Relay
5.Starter Circuit Relay

LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | | Hazard Switch | | | | Turn Signal Switch | | | | Passing Button | | | Dimmer Switch | | | SEL Button | | | Upper and Lower Button | | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | ○ | ● | | OFF | | | HI | ● | | Free | | | Upper | ● | | | Clutch Lever | | |
| Push | ● | ○ | ON(Push) | ○ | ● | ○ | OFF(Push) | | | | ON(Push) | ○ | ● | | | | Push | ○ | ● | Free | | | | Released | | |
| Released | | | | | | | Right | | ● | ○ | | | | LO | | | | | | Lower | | ● | ○ | Pulled In | ● | ○ |

W2L1728AW6 S

## Wiring Diagram (ZX636J with Immobilizer)




Starter Relay
1.ECU Fuse 15A
2.Main Fuse 30A

| IGNITION SWITCH CONNECTIONS | | | |
|---|---|---|---|
| | Battery | Ignition | Signal |
| Color | W | BR | BL |
| OFF,LOCK | | | |
| ON | ○ | ● | ● |

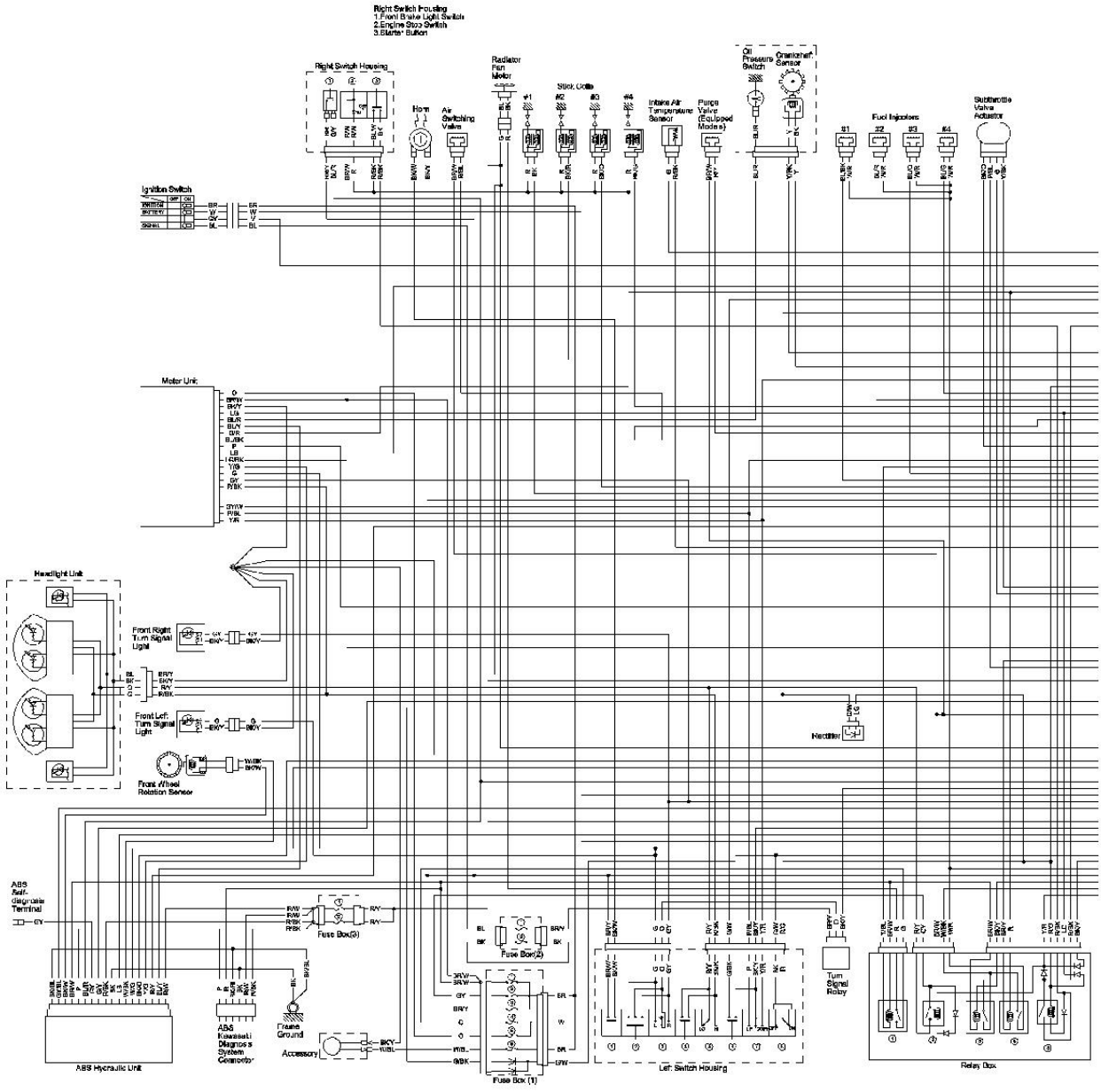
| RIGHT SWITCH HOUSING CONNECTIONS | | | | |
|---|---|---|---|---|
| SELECT Button | | Engine Start/Stop Switch | | |
| Color | BK | R | | Stop | Start |
| Free | | | Color | BL O | GY BK/R |
| Push | ● | ○ | OFF | | |
| | | | ON | ● | ● |

(98052-1728A,1732A)

| Color Code | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

W2R1728AW5 S

## Wiring Diagram (ZX636J without Immobilizer)




Fuse Box(3)
1.ABS Motor Relay Fuse 25A
2.ABS Solenoid Valve Relay Fuse 15A

Fuse Box(2)
1.Turn Signal Relay Fuse 7.5A
2.Spare Fuse 20A

Fuse Box (1)
1.Ignition Fuse 15A
2.Headlight Fuse 15A
3.Brake Light/Horn Fuse 7.5A
4.Radiator Fan Fuse 15A
5.Meter Fuse 7.5A
6.Accessory Fuse 2A

Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.SEL Button
7.Upper and Lower Button
8.Starter Lockout Switch

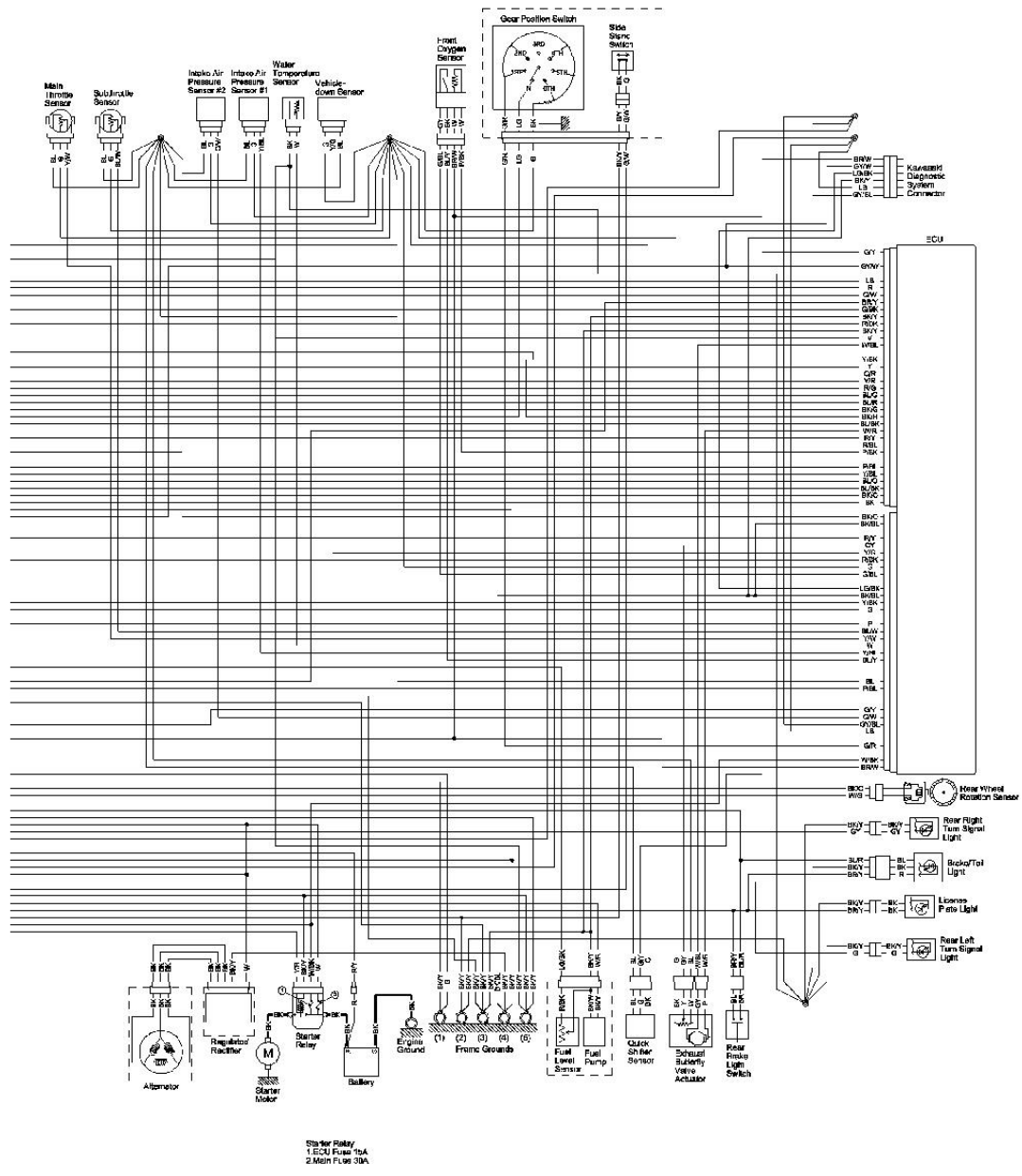
Relay Box
1.Radiator Fan Relay
2.Headlight Circuit Relay
3.ECU Main Relay
4.Fuel Pump Relay
5.Starter Circuit Relay

LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | | Hazard Switch | | | | Turn Signal Switch | | | | Passing Button | | | Dimmer Switch | | | SEL Button | | | Upper and Lower Button | | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | ○ | ● | | OFF | | | HI | ● | | Free | | | Upper | ● | | | Clutch Lever | | |
| Push | ● | ○ | ON(Push) | ○ | ● | ○ | OFF(Push) | | | | ON(Push) | ○ | ● | | | | Push | ○ | ● | Free | | | | Released | | |
| Released | | | | | | | Right | | ● | ○ | | | | LO | | | | | | Lower | | ● | ○ | Pulled In | ● | ○ |

W2L1730BW6 S

## Wiring Diagram (ZX636J without Immobilizer)




Starter Relay
1.ECU Fuse 15A
2.Main Fuse 30A

| IGNITION SWITCH CONNECTIONS | | | |
|---|---|---|---|
| | Battery | Ignition | Signal |
| Color | W | BR | BL |
| OFF,LOCK | | | |
| ON | ○ | ● | ○ |

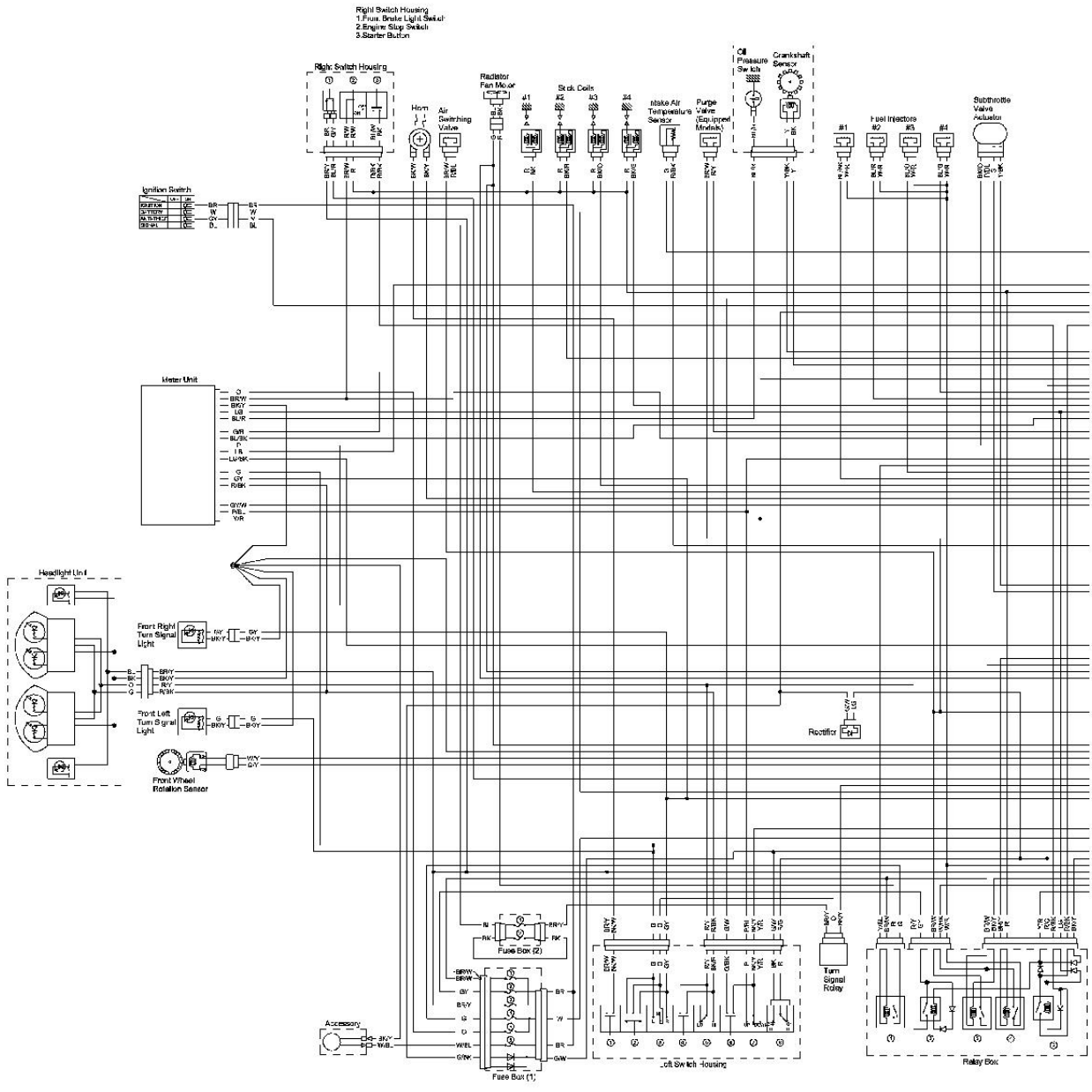
| RIGHT SWITCH HOUSING CONNECTIONS | | | | | |
|---|---|---|---|---|---|
| SELECT Button | | | Engine Start/Stop Switch | | |
| Color | BK | R | | Stop | Start |
| Free | | | Color | BL O | GY BK/R |
| Push | ● | ○ | OFF | | |
| | | | ON | ● | ● |

(98052-1729A,1730B)

| Color Code | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

W2R1730BW5 S

## Wiring Diagram (ZX636K)




Fuse Box (2)
1.Turn Signal Relay Fuse 7.5A
2.Spare Fuse 2A

Fuse Box (1)
1.Ignition Fuse 15A
2.Headlight Fuse 15A
3.Brake Light/Horn Fuse 7.5A
4.Radiator Fan Fuse *5A
5.Meter Fuse 7.5A
6.Accessory Fuse 2A

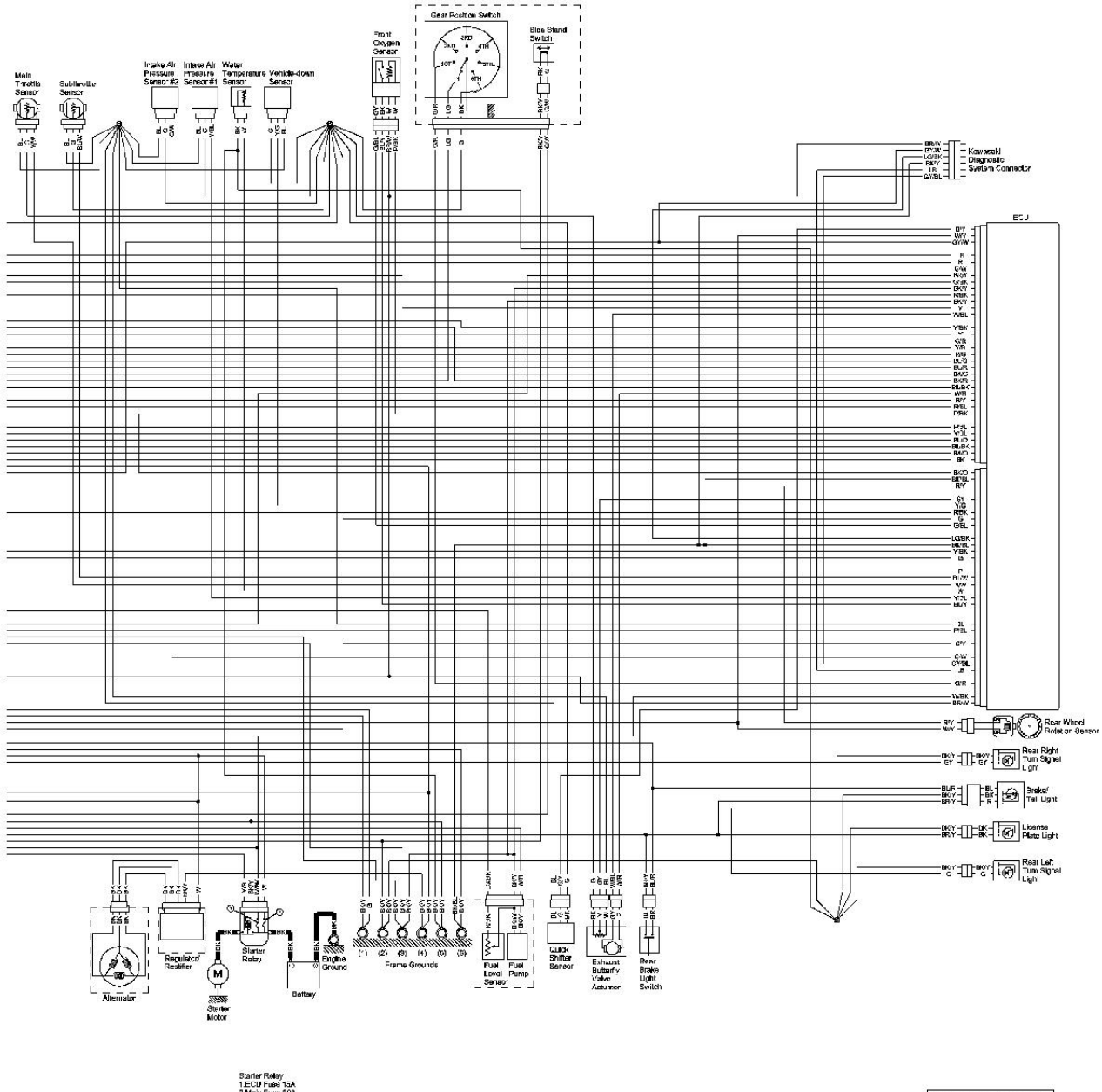
Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.SEL Button
7.Upper and Lower Button
8.Starter Lockout Switch

Relay Box
1.Radiator Fan Relay
2.Headlight Circuit Relay
3.ECU Main Relay
4.Fuel Pump Relay
5.Starter Circuit Relay

LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | | Hazard Switch | | | | Turn Signal Switch | | | | Passing Button | | | Dimmer Switch | | | SEL Button | | Upper and Lower Button | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | ● | | ● | OFF | | | HI | ● | | Free | | | Upper | ● | | | Clutch Lever | | |
| Push | ● | | ON(Push) | ● | | ● | OFF(Push) | | | | ON(Push) | ● | | | | | Push | ● | | Free | | | | Released | | |
| Released | | | | | | | Right | | ● | | | | | LO | | | | | | Lower | | ● | | Pulled In | ● | |

## Wiring Diagram (ZX636K)




Starter Relay
1.ECU Fuse 15A
2.Main Fuse 30A

| IGNITION SWITCH CONNECTIONS | | | |
|---|---|---|---|
| | Battery | Ignition | Signal |
| Color | W | BR | BL |
| OFF,LOCK | | | |
| ON | ● | ● | ● |

| RIGHT SWITCH HOUSING CONNECTIONS | | | | | | |
|---|---|---|---|---|---|---|
| SELECT Button | | | Engine Start/Stop Switch | | | |
| Color | BK | R | | Stop | | Start |
| Free | | | Color | BL | O | GY | BK/R |
| Push | ● | ● | OFF | | | | |
| | | | ON | ● | | ● | |

(98052-1734A,1735B)

| Color Code | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

W2R1735BW5 S

## Precautions

There are a number of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- Because of the large amount of current, never keep the starter button pushed when the starter motor will not turn over, or the current may burn out the starter motor windings.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, etc. Poor leads and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).

## Electrical Wiring

### *Wiring Inspection*

- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is poor, replace the damaged wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

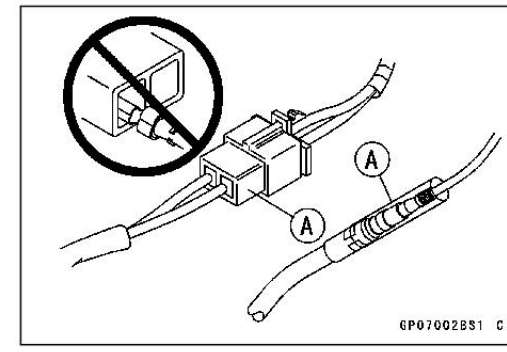
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

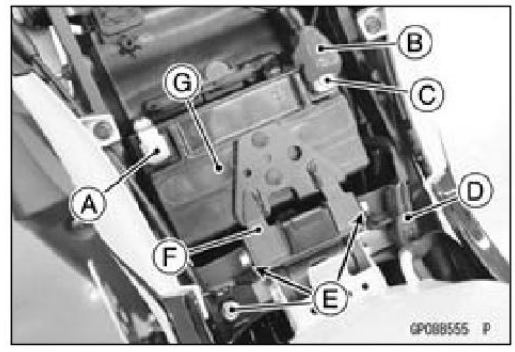
○Connect a digital meter between the ends of the leads.

★If the digital meter does not read about 0 Ω, the lead is defective. Replace the lead or the main harness if necessary.



## Battery

### *Battery Removal*

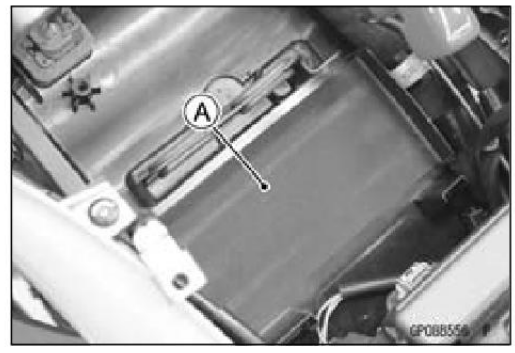


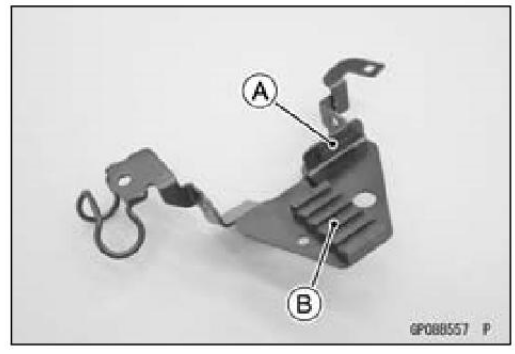

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal(15-8)).
- Disconnect the negative (–) cable [A].

| *NOTICE* |
| --- |
| **Be sure to disconnect the negative (–) cable first.** |

- Slide out the red cap [B] and disconnect the positive (+) cable [C].
- Disconnect the fuel pump connector [D], and remove the connector from the bracket.
- Remove:
  Bolts [E]
  Bracket [F]
  Battery [G]

### *Battery Installation*

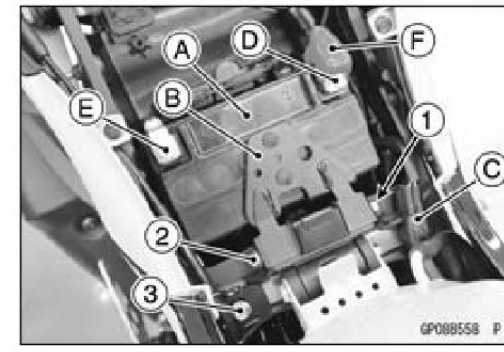



- Be sure that the ignition switch is turned off.
- Check that the pads [A] and damper [B] are in place.

## Battery

- Put the battery [A] into the rear fender.
- Install:
  Bracket [B]
- Tighten the bolts following specified tightening sequence [1 – 3].
- Install the fuel pump connector [C] to the bracket, and connect the connector.
- Connect the positive (+) cable [D] (red cap) to the positive (+) terminal first, and then the negative (–) cable [E] to the negative (–) terminal.




**NOTE**

○*When connecting the battery negative (–) cable, be sure to tighten the terminal bolt while pressing the battery cable terminal against the battery terminal.*

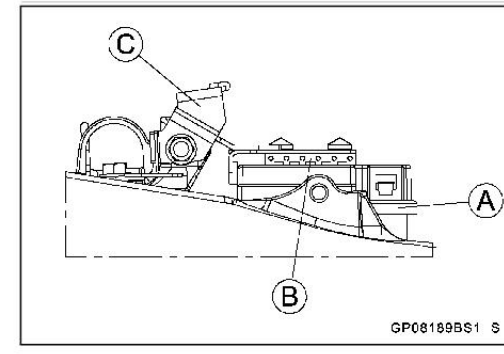
- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the red cap [F].

***NOTICE***

**If each battery cable is not correctly disconnected or connected, sparks can arise at electrical connections, causing damage to electrical and DFI parts.**

○Make sure that there is no clearance between the battery [A] and damper [B] after installing the bracket [C].

- Install the front seat (see Front Seat Installation(15-8)).



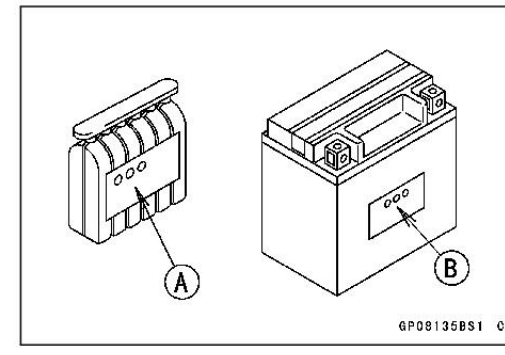

### *Battery Activation*

**Electrolyte Filling**

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

**Battery Model Name**

**ZX636J/K: YTX9-BS**



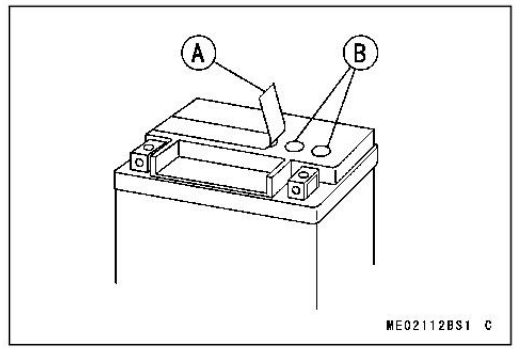

***NOTICE***

**Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.**

## Battery

***NOTICE***

**Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.**




**⚠ DANGER**

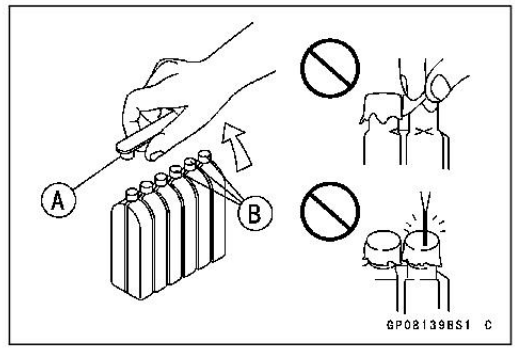
**Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.**

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

**NOTE**

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

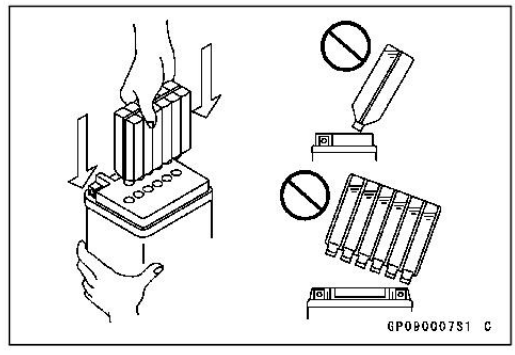
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.




**NOTE**

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.



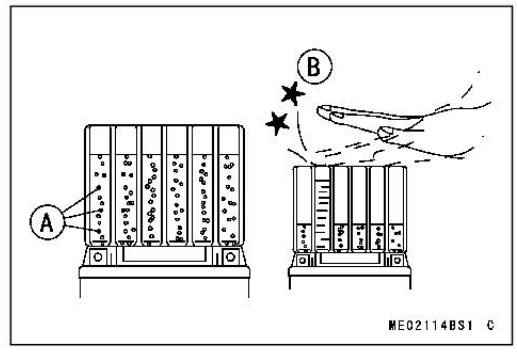

**NOTE**

○*Do not tilt the electrolyte container.*

## Battery

- Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.




**NOTE**

○*Be careful not to have the battery fall down.*

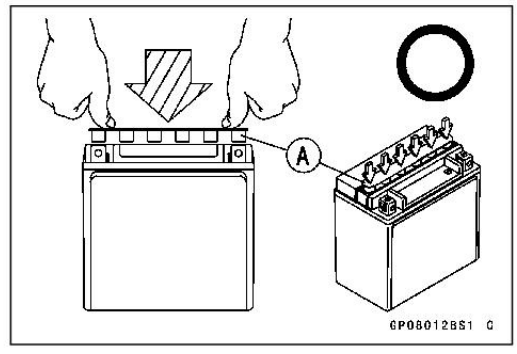
- Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.

***NOTICE***

**Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.**

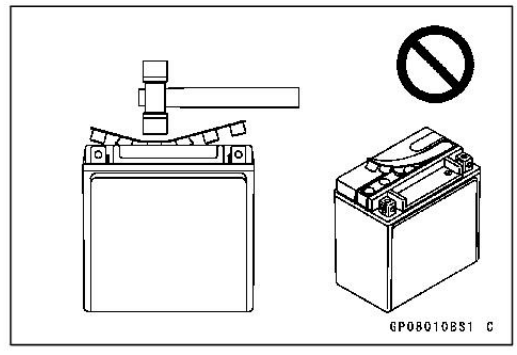
- After filling, let the battery sit for 20 – 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.

- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.




***NOTICE***

**Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.**




**NOTE**

○*Charging the battery immediately after filling can shorten service life.*

## Battery

### Initial Charge

● Newly activated sealed batteries require an initial charge.

**Standard Charge: 0.9 A × 5 – 10 hours**

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

**Kawasaki-recommended chargers:**
**Battery Mate 150-9**
**OptiMate PRO 4-S/PRO S/PRO2**
**Yuasa MB-2040/2060**
**Christie C10122S**

★If the above chargers are not available, use equivalent one.

● Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

**NOTE**

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.8 V, repeat charging cycle.*

○*To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds.*
*Re-check voltage and if less than 12.8 V repeat the charging cycle and load test. If still below 12.8 V the battery is defective.*

### *Precautions*

1) No need of topping-up
No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

2) Refreshing charge
If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge(16-29)).
When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

***NOTICE***

**This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.**
**If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.**

3) When you do not use the motorcycle for months.
Give a refresh charge before you store the motorcycle and store it with the negative cable removed. Give a refresh charge **once a month** during storage.

4) Battery life
If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

## Battery

**⚠ DANGER**

**Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.**

### *Interchange*

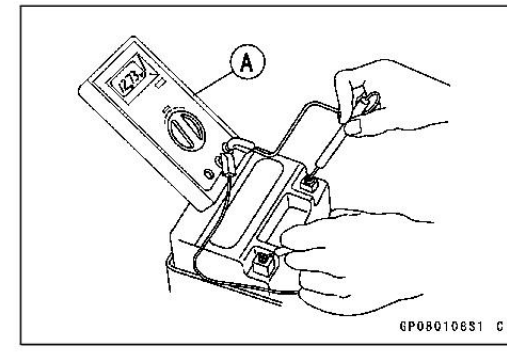
A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

### *Charging Condition Inspection*

○Battery charging condition can be checked by measuring battery terminal voltage with a digital voltmeter [A].

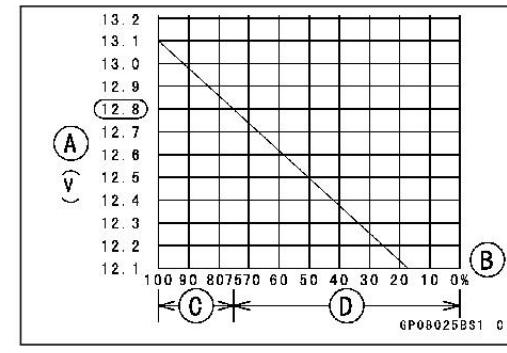
- Remove the battery (see Battery Removal(16-24)).
- Measure the battery terminal voltage.




**NOTE**

○*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.




**Battery Terminal Voltage**

**Standard: 12.8 V or more**

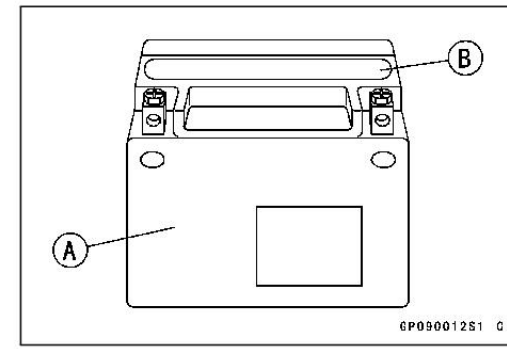
Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]

### *Refreshing Charge*

- Remove the battery [A] (see Battery Removal(16-24)).
- Do refresh charge by following method according to the battery terminal voltage.

**⚠ WARNING**

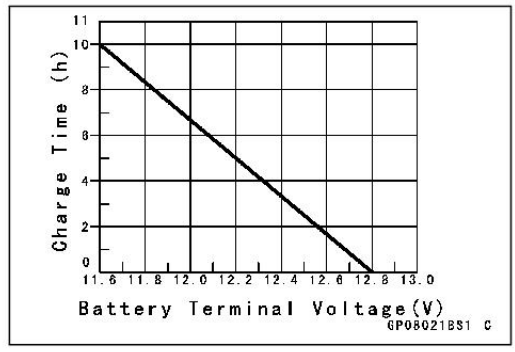
**This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.**



## Battery

**Terminal Voltage: 11.5 – less than 12.8 V**
**Standard Charge 0.9 A × 5 – 10 h (see following chart)**
**Quick Charge 4 A × 1 h**

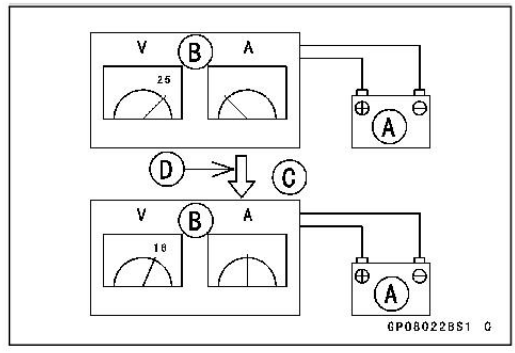
| *NOTICE* |
|---|
| **If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.** |




**Terminal Voltage: less than 11.5 V**
**Charging Method: 0.9 A × 20 h**

### NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*




Battery [A]
Battery Charger [B]
Standard Value [C]
Current starts to flow [D]

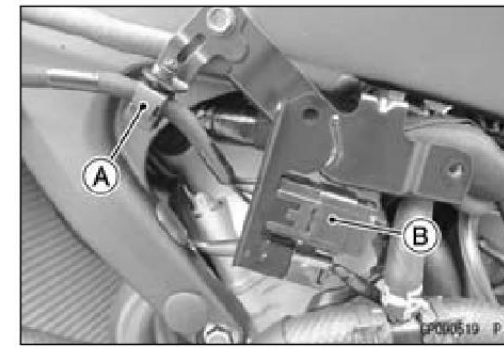
● Determine the battery condition after refresh charge.
○Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

| Criteria | Judgement |
|---|---|
| 12.8 V or higher | Good |
| 12.0 – lower than 12.8 V | Charge insufficient → Recharge |
| lower than 12.0 V | Unserviceable → Replace |

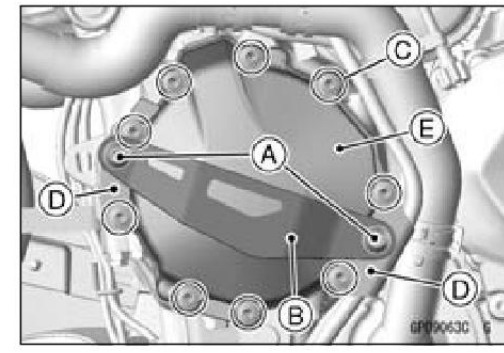
## Charging System

### *Alternator Cover Removal*

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
  Left Middle Inner Fairing (see Middle Inner Fairing Removal(15-12))
- Open the clamp [A].
- Remove the alternator connector [B] from the bracket.
- Disconnect the alternator connector.




- Remove:
  Plate Bolts [A]
  Plate [B] with Collars
  Alternator Cover Bolts [C]
  Brackets [D] and Collars
  Alternator Cover [E]

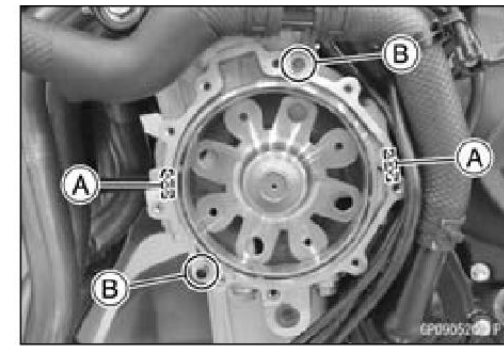



### *Alternator Cover Installation*

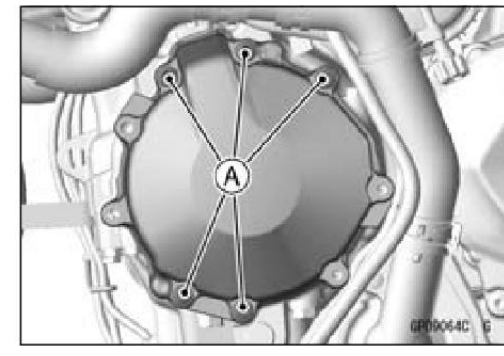
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

  **Sealant - Liquid Gasket, TB1211F: 92104-0004**

- Check that dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.




- Temporarily tighten the alternator cover bolts [A].

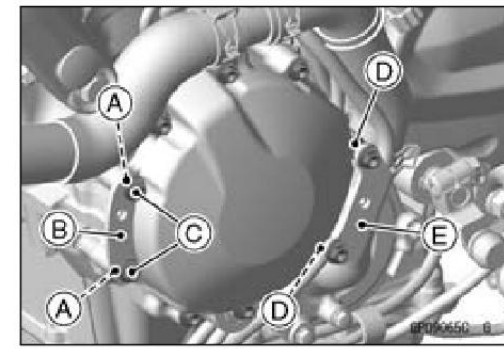



- Install:
  Collars (t = 2 mm) [A]
  Bracket (Front) [B]
- Temporarily tighten the alternator cover bolts [C].
- Install:
  Collars (L = 10 mm) [D]
  Bracket (Rear) [E]

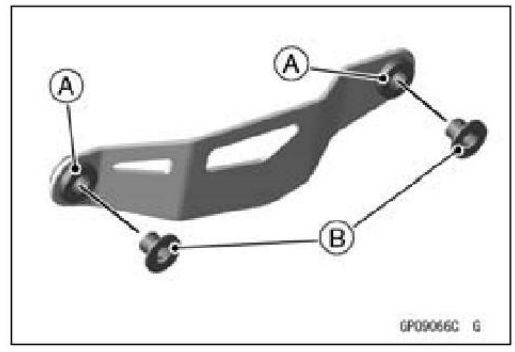
○Position the collars [A] [D] between the alternator cover and bracket.

- Tighten the all alternator cover bolts with the specified torque.

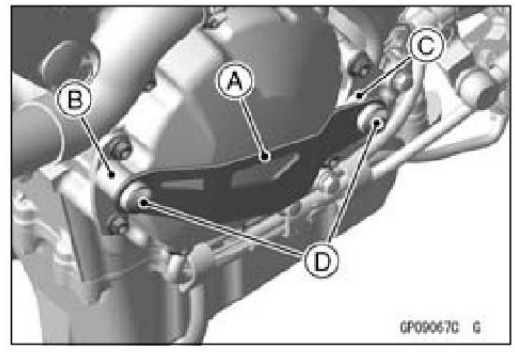
  **Torque - Alternator Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**



- Install the dampers [A] to the plate, if removed.
- Install the collars [B].

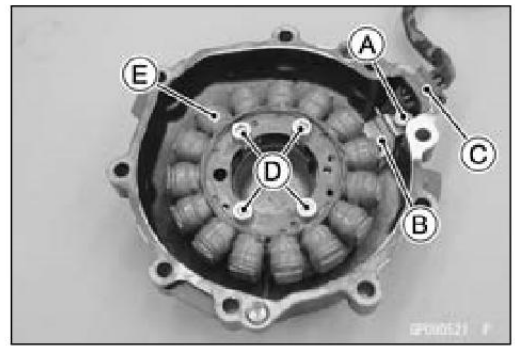



- Install the plate [A] as shown so that position the collars [B] [C] inside of the plate.
  Collar [B]: L = 15 mm
  Collar [C]: L = 10 mm
- Tighten the plate bolts [D] securely.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).




### *Stator Coil Removal*

- Remove:
  Alternator Cover (see Alternator Cover Removal(16-31))
  Alternator Lead Holding Plate Bolt [A] and Plate [B]
  Alternator Lead Grommet [C]
  Stator Coil Bolts [D]
- Remove the stator coil [E] from the alternator cover.




### *Stator Coil Installation*

- Replace the stator coil bolts with new ones, and tighten them.

**Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)**

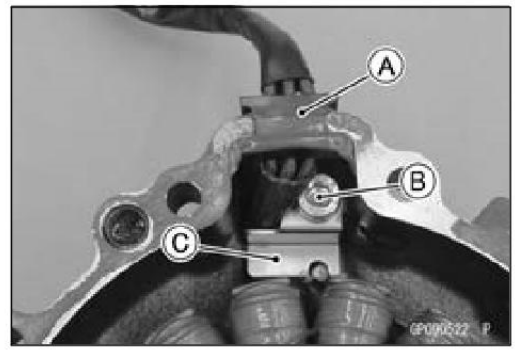
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet [A], and fit the grommet into the notch of the cover securely.

**Sealant - Liquid Gasket, TB1211F: 92104-0004**

- Replace the alternator lead holding plate bolt [B] with a new one.
- Secure the alternator lead with a holding plate [C].
- Tighten:

**Torque - Alternator Lead Holding Plate Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)**

- Install the alternator cover (see Alternator Cover Installation(16-31)).

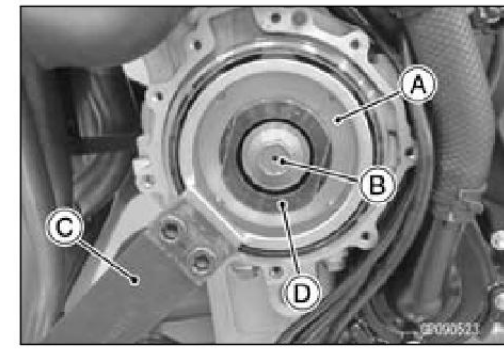


## Charging System

### *Alternator Rotor Removal*

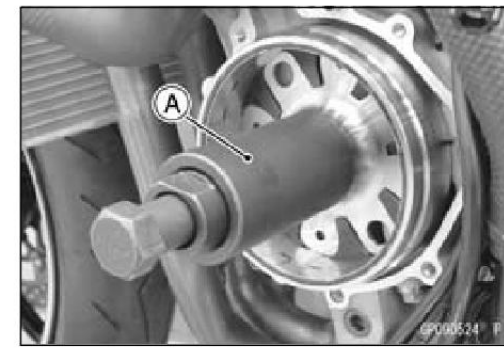
- Remove the alternator cover (see Alternator Cover Removal(16-31)).
- Clean off the oil from the outer circumference of the rotor.
- Hold the alternator rotor steady with the rotor holder [A], and remove the rotor bolt [B] and washer.

**Special Tools - Grip [C]: 57001-1591**
**Rotor Holder: 57001-1666**
**Stopper [D]: 57001-1679**
**Rotor Holder Attachment: 57001-1689**




- Using the flywheel puller [A], remove the alternator rotor from the crankshaft.

**Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615**

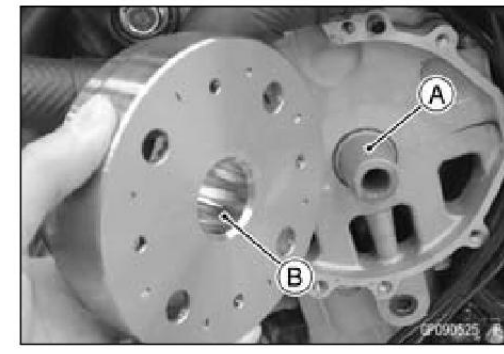



**NOTICE**

**Do not attempt to strike the alternator rotor itself. Striking the rotor can cause the magnets to lose their magnetism.**

### *Alternator Rotor Installation*

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Install the alternator rotor.

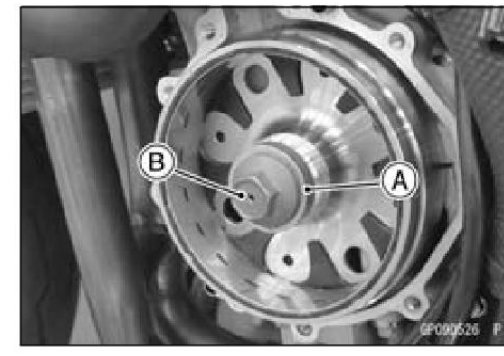



- Using a cleaning fluid, clean off any oil or dirt on the washer [A] and dry it with a clean cloth.
- Install the washer.

**NOTE**

○*Confirm the alternator rotor fit or not to the crankshaft before tightening it with specified torque.*

- Install the rotor bolt [B] and tighten it with 155 N·m (15.8 kgf·m, 114 ft·lb) of torque.

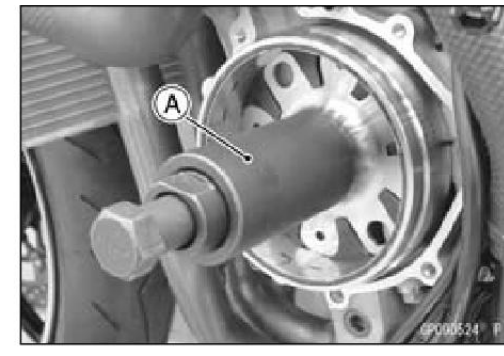



- Remove the rotor bolt and washer.
- Check the tightening torque with flywheel puller [A].

**Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615**

★If the rotor is not pulled out with 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, it is installed correctly.

★If the rotor is pulled out with under 20 N·m (2.0 kgf·m, 15 ft·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then, confirm that it is not pulled out with above torque.

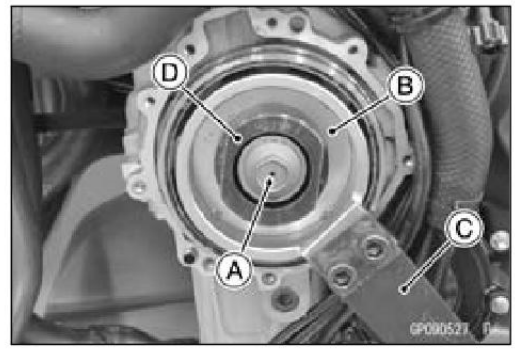


## Charging System

- Install the washer and rotor bolt.
- Tighten the alternator rotor bolt [A] while holding the alternator rotor steadily with the holder [B].

**Special Tools - Grip [C]: 57001-1591**
**Rotor Holder: 57001-1666**
**Stopper [D]: 57001-1679**
**Rotor Holder Attachment: 57001-1689**

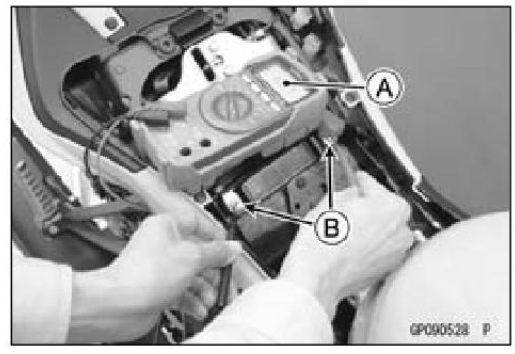
**Torque - Alternator Rotor Bolt: 155 N·m (15.8 kgf·m, 114 ft·lb)**




- Install the alternator cover (see Alternator Cover Installation(16-31)).

### *Charging Voltage Inspection*

- Check the battery condition (see Charging Condition Inspection(16-29)).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal(15-8)).
- Check that the ignition switch is turned off, and connect a digital meter [A] to the battery terminals [B].
- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector.). The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.




**Charging Voltage** **@25° (77°F)**

| Connections | | Reading |
|---|---|---|
| Digital Meter (+) to | Digital Meter (–) to | |
| Battery (+) | Battery (–) | DC 14.3 – 14.7 V |

- Turn off the ignition switch to stop the engine, and disconnect a digital meter.

★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.

★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★ If the charging voltage does not rise as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

### *Alternator Inspection*

There are three types of alternator failures: short, open (wire burned out), or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

## Charging System

● To check the alternator output voltage, do the following procedures.
○Turn the ignition switch off.
○Disconnect the alternator connector (see Alternator Cover Removal(16-31)).
○Connect a digital meter as shown in the table 1.
○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

**Table 1 Alternator Output Voltage @4 000 r/min (rpm)**

| Connections | | Reading |
|---|---|---|
| Digital Meter (+) to | Digital Meter (–) to | |
| One BK lead | Another BK lead | AC 37.6 – 56.4 V |

★If the output voltage shows the value in the table, the alternator operates properly.
★If the output voltage shows a much lower reading than that given in the table, stop the engine and inspect the stator coil resistance.
● Check the stator coil resistance as follows.
○Stop the engine.
○Connect the a digital meter as shown in the table 2.
○Note the readings (total 3 measurements).

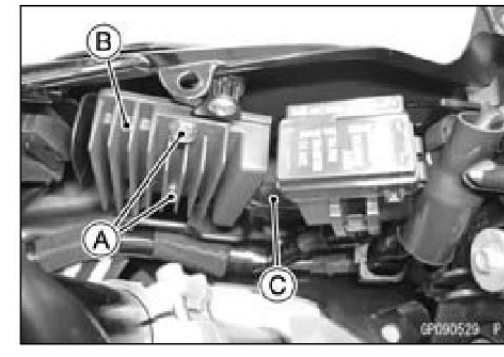
**Table 2 Stator Coil Resistance @20°C (68°F)**

| Connections | | Reading |
|---|---|---|
| Digital Meter (+) to | Digital Meter (–) to | |
| One BK lead | Another BK lead | 0.106 – 0.160 Ω |

When measuring the resistance, use a digital meter that can measure the standard value.
★If there is more resistance than shown in the table, or no digital meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
● Measure the resistance between each of the black leads and chassis ground.
★Any digital meter reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coil has normal resistance, but the voltage check showed the alternator to be defective; then the rotor magnets have probably weakened, and the rotor must be replaced.

### *Regulator/Rectifier Removal*

● Remove the left upper inner fairing (see Upper Inner Fairing Removal(15-17)).
● Remove:
Bolts [A]
Regulator/Rectifier [B] (with connector connected)
● Disconnect the connector [C].




### *Regulator/Rectifier Installation*

● Installation is the reverse of removal.

## Charging System

### *Regulator/Rectifier Inspection*

- Refer to the Charging System Troubleshooting for the Regulator/Rectifier Inspection.

**Charging System Troubleshooting**

- Before inspection, remove all accessories that consume electrical power.

**NOTE**

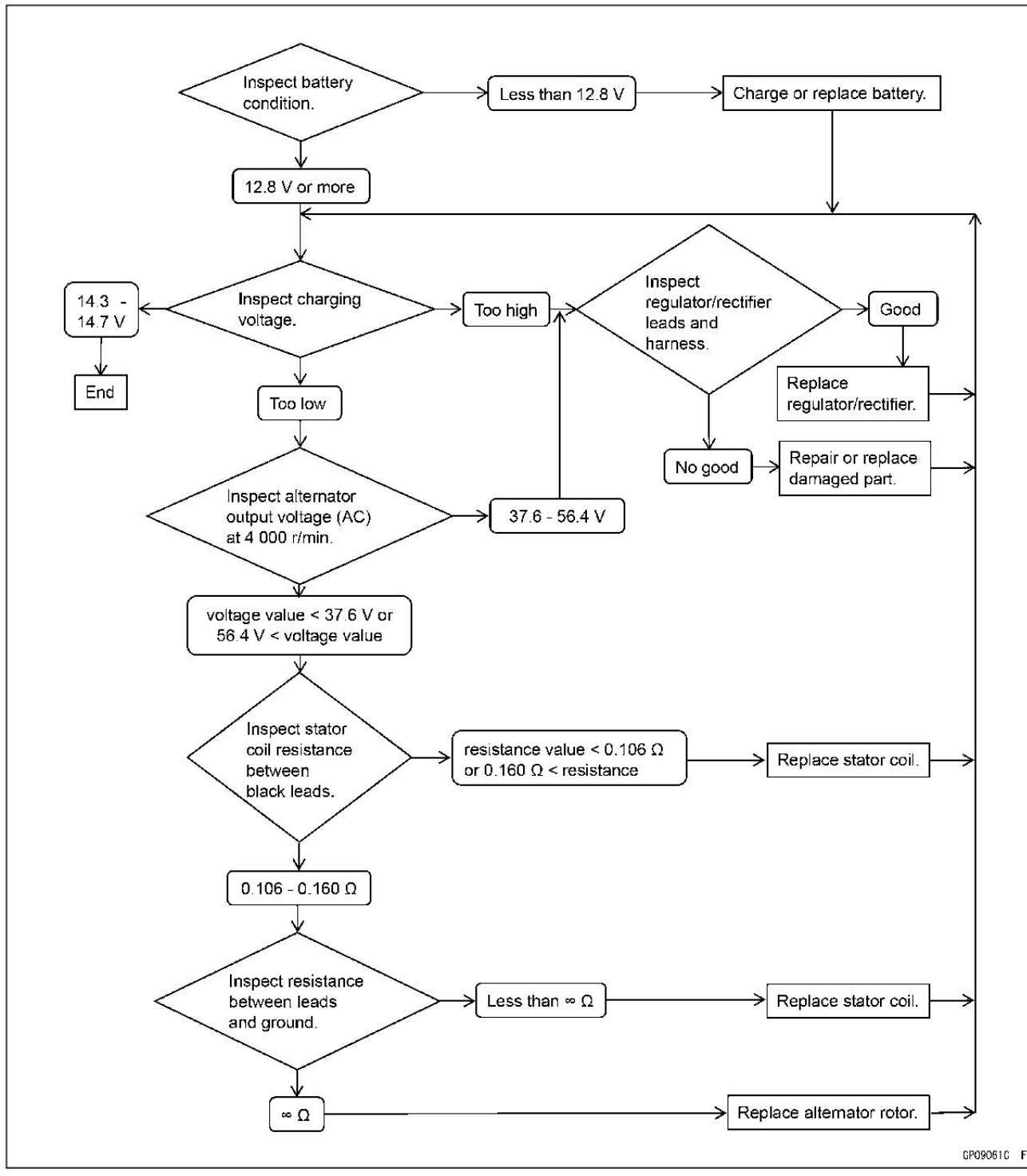
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed
Frequent and unnecessary brake pedal dragging
→ Battery Discharged

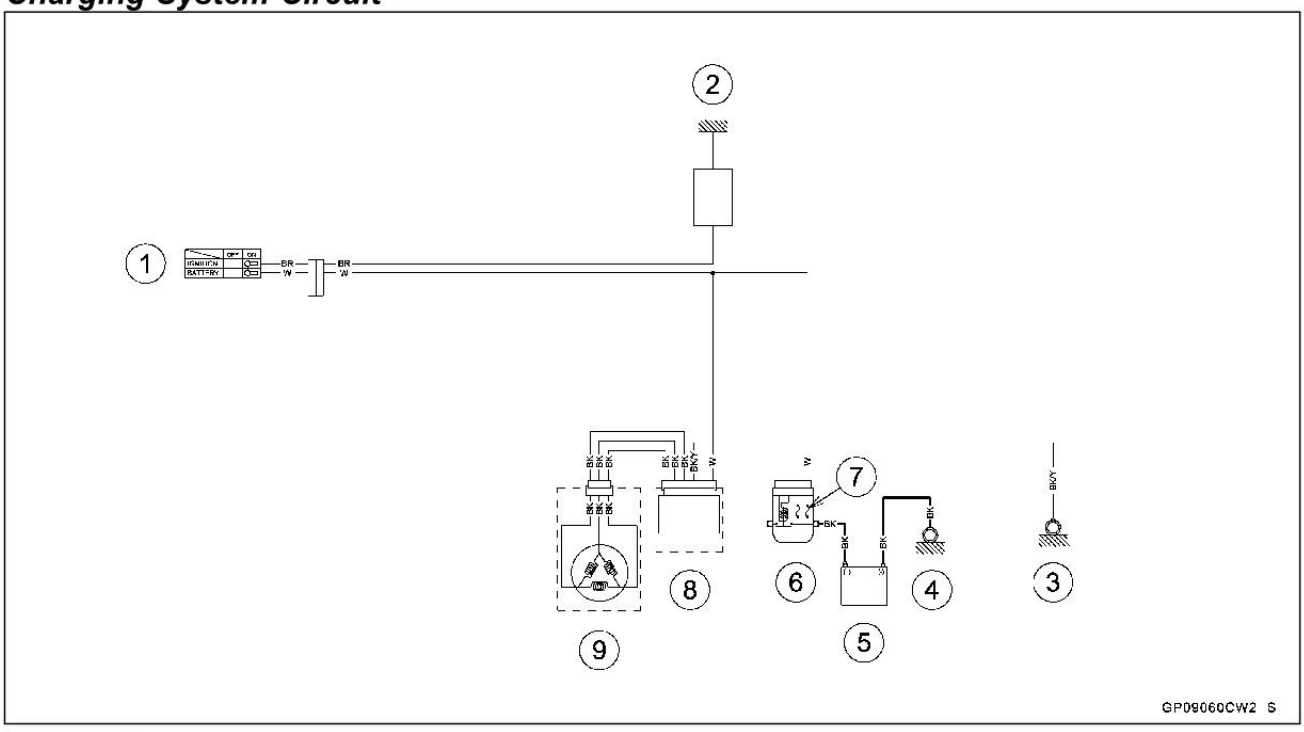
- Recharge the battery if it is discharged.

## Charging System


Inspect battery condition.
Less than 12.8 V
Charge or replace battery.
12.8 V or more
Inspect charging voltage.
14.3 - 14.7 V
End
Too high
Too low
Inspect regulator/rectifier leads and harness.
Good
Replace regulator/rectifier.
No good
Repair or replace damaged part.
Inspect alternator output voltage (AC) at 4 000 r/min.
37.6 - 56.4 V
voltage value < 37.6 V or 56.4 V < voltage value
Inspect stator coil resistance between black leads.
resistance value < 0.106 Ω or 0.160 Ω < resistance
Replace stator coil.
0.106 - 0.160 Ω
Inspect resistance between leads and ground.
Less than ∞ Ω
Replace stator coil.
∞ Ω
Replace alternator rotor.
GP090610 F

## Charging System

### *Charging System Circuit*


2
1
OFF
ON
IGNITION
BATTERY
BR
W
BR
W
BK
BK
BK

## Ignition System

**⚠ WARNING**

**The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.**

***NOTICE***

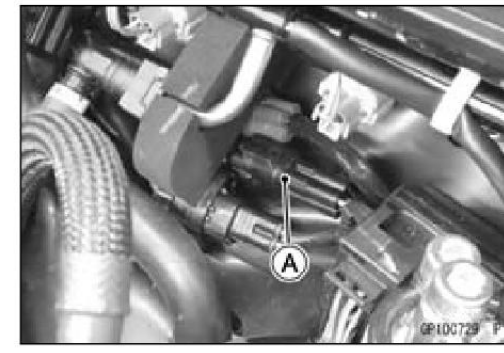
**Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent ECU damage.**
**Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the ECU.**

### *Crankshaft Sensor Removal*

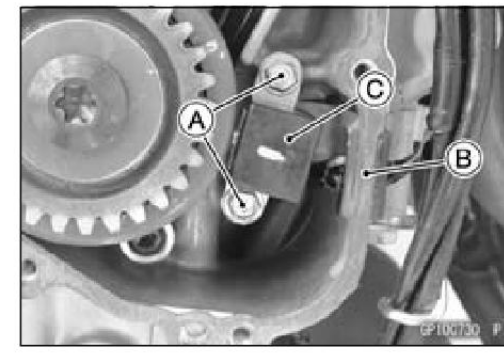
***NOTICE***

**Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.**

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect the crankshaft sensor connector [A].




- Remove:
  Idle Gear (Starter Clutch Side) (see Starter Idle Gear Removal(9-32))
  Crankshaft Sensor Bolts [A]
  Crankshaft Sensor Lead Grommet [B]
  Crankshaft Sensor [C]



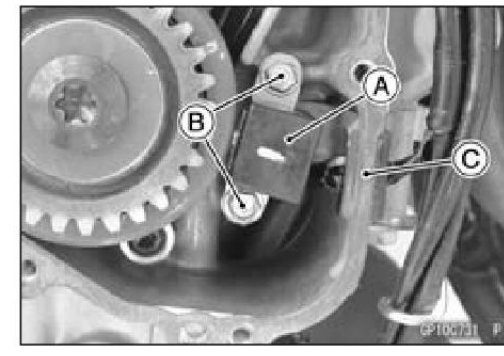

### *Crankshaft Sensor Installation*

- Install the crankshaft sensor [A].

○When installing the sensor which is fastened by bolts, tighten the bolts after placing the sensor on the bottom surface completely.

- Tighten:

**Torque - Crankshaft Sensor Bolts [B]: 6.0 N·m (0.61 kgf·m, 53 in·lb)**

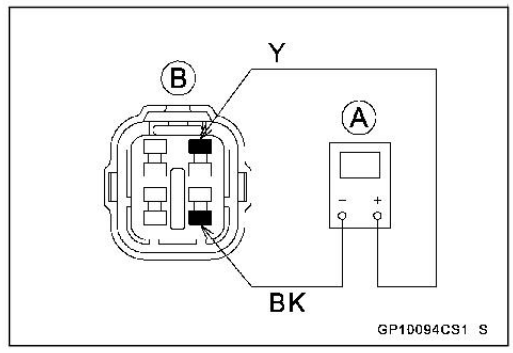



- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the crankshaft sensor lead grommet [C], and fit the grommet into the notch of the crankcase securely.

**Sealant - Liquid Gasket, TB1211F: 92104-0004**

- Run the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

### *Crankshaft Sensor Inspection*




- Disconnect the crankshaft sensor connector (see Crankshaft Sensor Removal(16-39)).
- Connect a digital meter [A] to the crankshaft sensor connector [B].

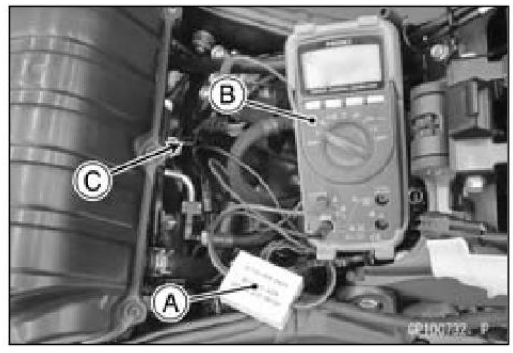
**Crankshaft Sensor Resistance**
**Connections:**
**Digital Meter (+) → BK lead**
**Digital Meter (–) → Y lead**
**Standard: 368 – 552 Ω @20°C (68°F)**

★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

- Measure the resistance between the crankshaft sensor leads and chassis ground.

★Any digital meter reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor.

### *Crankshaft Sensor Peak Voltage Inspection*




**NOTE**

○*Be sure the battery is fully charged.*
○*Using the peak voltage adapter [A] is more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.*

- Disconnect the crankshaft sensor connector ((see Crankshaft Sensor Removal(16-39)).
- Connect a digital meter [B] to the peak voltage adapter.

**Special Tool - Peak Voltage Adapter: 57001-1415**
**Type: KEK-54-9-B**

- Connect the adapter to the terminals of the crankshaft sensor connector [C].

**Connections:**

| Crankshaft Sensor Connector | | Peak Voltage Adapter | | Digital Meter |
|---|---|---|---|---|
| BK lead | ← | R lead | → | (+) |
| Y lead | ← | BK lead | → | (–) |

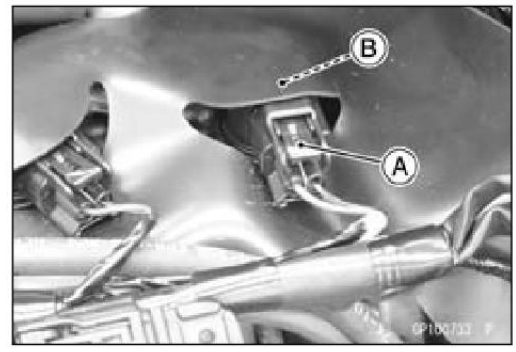
- Turn the engine stop switch to run position.
- Turn the ignition switch on.
- Pushing the starter button, turn the engine 4 – 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurements 5 or more times.

**Crankshaft Sensor Peak Voltage**
**Standard: 3.8 V or more**

★If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection(16-40)).

## Ignition System

### *Stick Coil Removal*



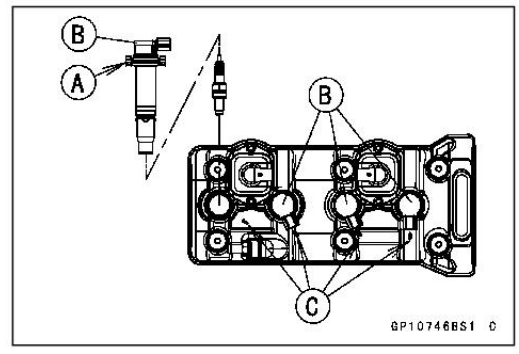

| NOTICE |
| --- |
| **Never drop the stick coils, especially on a hard surface.**<br>**Such a shock to the stick coils can damage it.** |

- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Disconnect the stick coil connectors [A].
- Pull out the stick coils [B] upward.

○First, turn the stick coil by 90 degrees, and then pull it out by twisting the coil head to the left and right while holding it securely by hand.

| NOTICE |
| --- |
| **Do not pry the connector part of the coil while removing the coil.** |

### *Stick Coil Installation*

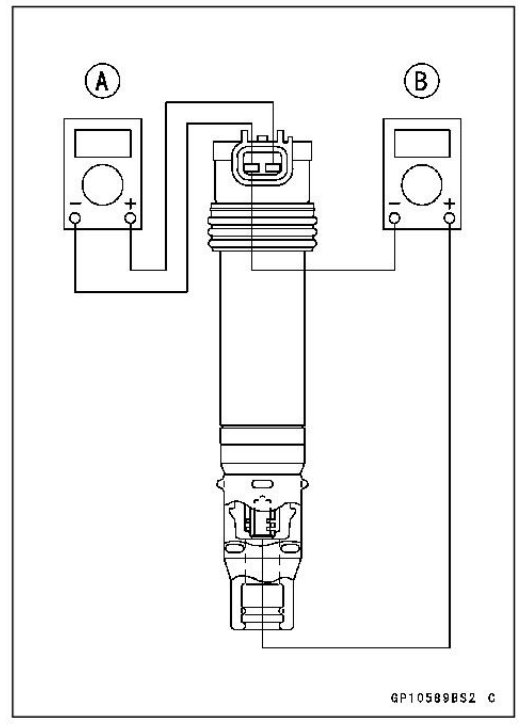



- Apply a thin coat of grease [A] to the stick coils for easy installation.
- Insert the stick coils [B] so that the coil heads align with the lines [C] on the cylinder head cover.

| NOTICE |
| --- |
| **Do not tap the coil head while installing the coil.** |

- After installation, be sure the stick coils are installed securely by pulling up them lightly.
- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

### *Stick Coil Inspection*




- Remove the stick coils (see Stick Coil Removal(16-41)).
- Measure the primary winding resistance [A] as follows.

○Connect a digital meter between the coil terminals.

- Measure the secondary winding resistance [B] as follows.

○Connect a digital meter between the plug terminal and (–) coil terminal.

**Stick Coil Winding Resistance**

| | |
| --- | --- |
| **Primary Windings:** | **0.85 – 1.15 Ω @20°C (68°F)** |
| **Secondary Windings:** | **6.7 – 9.1 kΩ @20°C (68°F)** |

★If a digital meter does not read as specified, replace the coil.

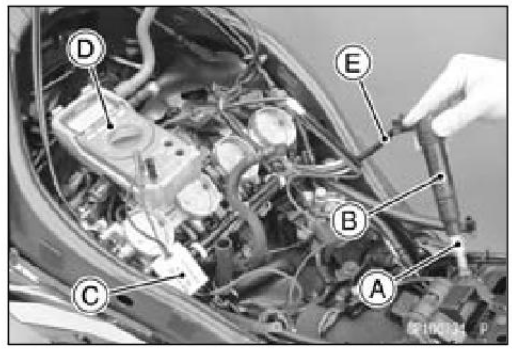
## Ignition System

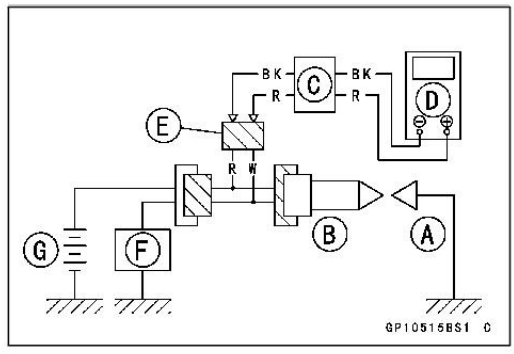
### *Stick Coil Primary Peak Voltage Inspection*

**NOTE**

○*Be sure the battery is fully charged.*

● Remove the stick coils (see Stick Coil Removal(16-41)).
○Do not remove the spark plugs.
● Measure the primary peak voltage as follows.
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into a digital meter [D].
○Connect the adapter to the lead wire-peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]




**Special Tools - Peak Voltage Adapter: 57001-1415**
**Type: KEK-54-9-B**
**Lead Wire-Peak Voltage Adapter: 57001-1449**

**Connections:**
**Adapter (R, +) → Lead Wire-Peak Voltage Adapter (W)**
**Adapter (BK, –) → Lead Wire-Peak Voltage Adapter (R)**

**⚠ WARNING**

**To avoid extremely high voltage shocks, do not touch the spark plugs or digital meter connections.**

● Turn the engine stop switch to run position.
● Turn the ignition switch on.
● Pushing the starter button, turn the engine 4 – 5 seconds with the transmission in neutral to measure the primary peak voltage.
● Repeat the measurements 5 times for one stick coil.

**Stick Coil Primary Peak Voltage**
**Standard: 120 V or more**

● Repeat the test for the other stick coils.
★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection(16-41))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-40))
ECU (see ECU Power Supply Inspection(3-13))

### *Spark Plug Removal*

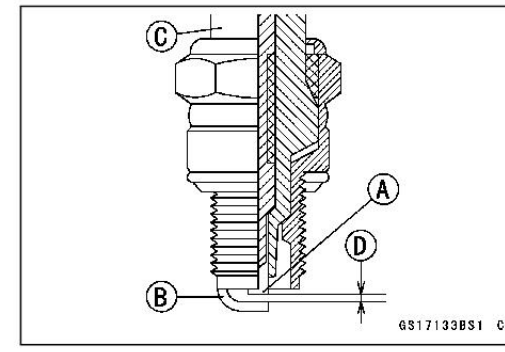
● Refer to the Spark Plug Replacement (see Spark Plug Replacement(2-63)).

### *Spark Plug Installation*

● Refer to the Spark Plug Replacement (see Spark Plug Replacement(2-63)).

## Ignition System

### *Spark Plug Condition Inspection*




- Remove the spark plugs (see Spark Plug Replacement(2-63)).
- Visually inspect the spark plugs.

★If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged, or if the insulator [C] is cracked, replace the plug.

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

- Measure the gap [D] with a wire-type thickness gauge.

★If the gap is incorrect, replace the spark plug.

**Spark Plug Gap: 0.7 – 0.8 mm (0.028 – 0.031 in.)**

- Use the standard spark plug or its equivalent.

**Standard Spark Plug**
**Type: NGK CR9E**

### *Interlock Operation Inspection*

- Raise the rear wheel off the ground with the stand.

**1st Check**

- Start the engine to the following conditions.

**Condition:**
**Transmission Gear → 1st Position**
**Clutch Lever → Release**
**Sidestand → Down or Up**

○Turn the ignition switch on and push the starter button.
○Then the starter motor should not turn when the starter system circuit is normality.

★If the engine is started, inspect the starter lockout switch, gear position switch and relay box.

**2nd Check**

- Start the engine to the following conditions.

**Condition:**
**Transmission Gear → 1st Position**
**Clutch Lever → Pulled in**
**Sidestand → Up**

○Turn the ignition switch on and push the starter button.
○Then the starter motor should turn when the starter system circuit is normality.

★If the starter motor does not turn, inspect the starter lockout switch, sidestand switch, relay box and starter relay.

## Ignition System

**3rd Check**

- Inspect the engine for its secure stop after the following operations are completed.
- Run the engine to the following conditions.

**Condition:**

**Transmission Gear → 1st Position**

**Clutch Lever → Release**

**Sidestand → Up**

- Set the sidestand on the ground, then the engine will stop.

★If the engine may not be stopped, inspect the gear position switch, sidestand switch and relay box.

★If their parts are normality, replace the ECU.

### *IC Igniter Inspection*

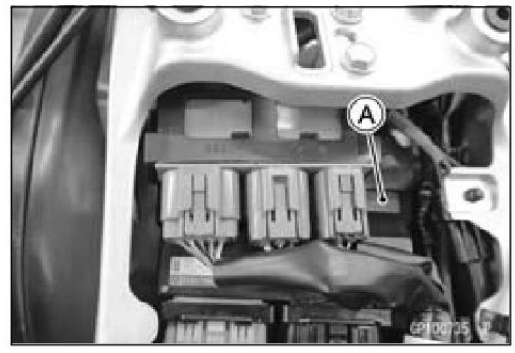
○The IC igniter is built in the ECU [A].

- Refer to the following items.

Interlock Operation Inspection (see Interlock Operation Inspection(16-43))

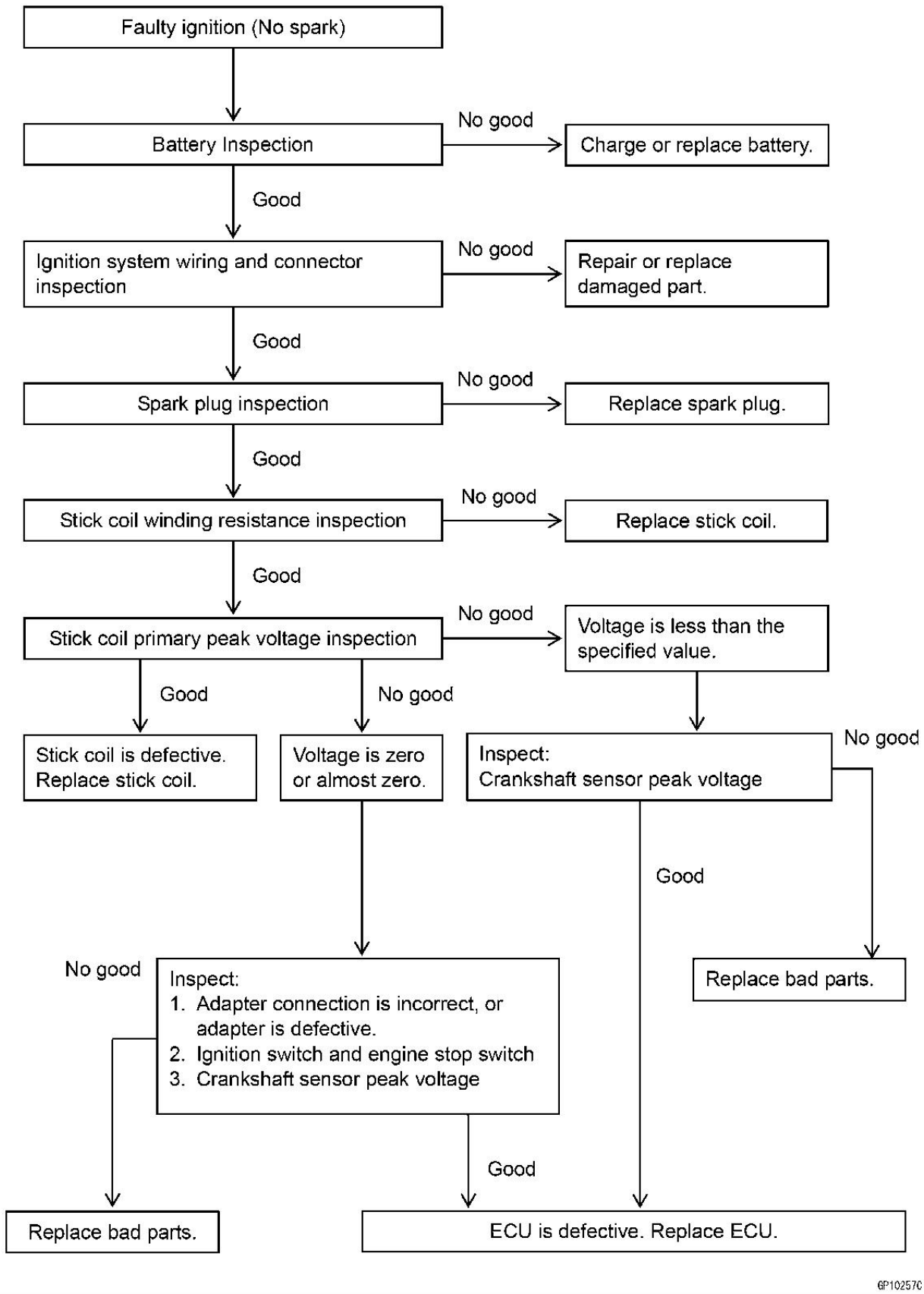
Ignition System Troubleshooting

ECU Power Supply Inspection (see ECU Power Supply Inspection(3-13))



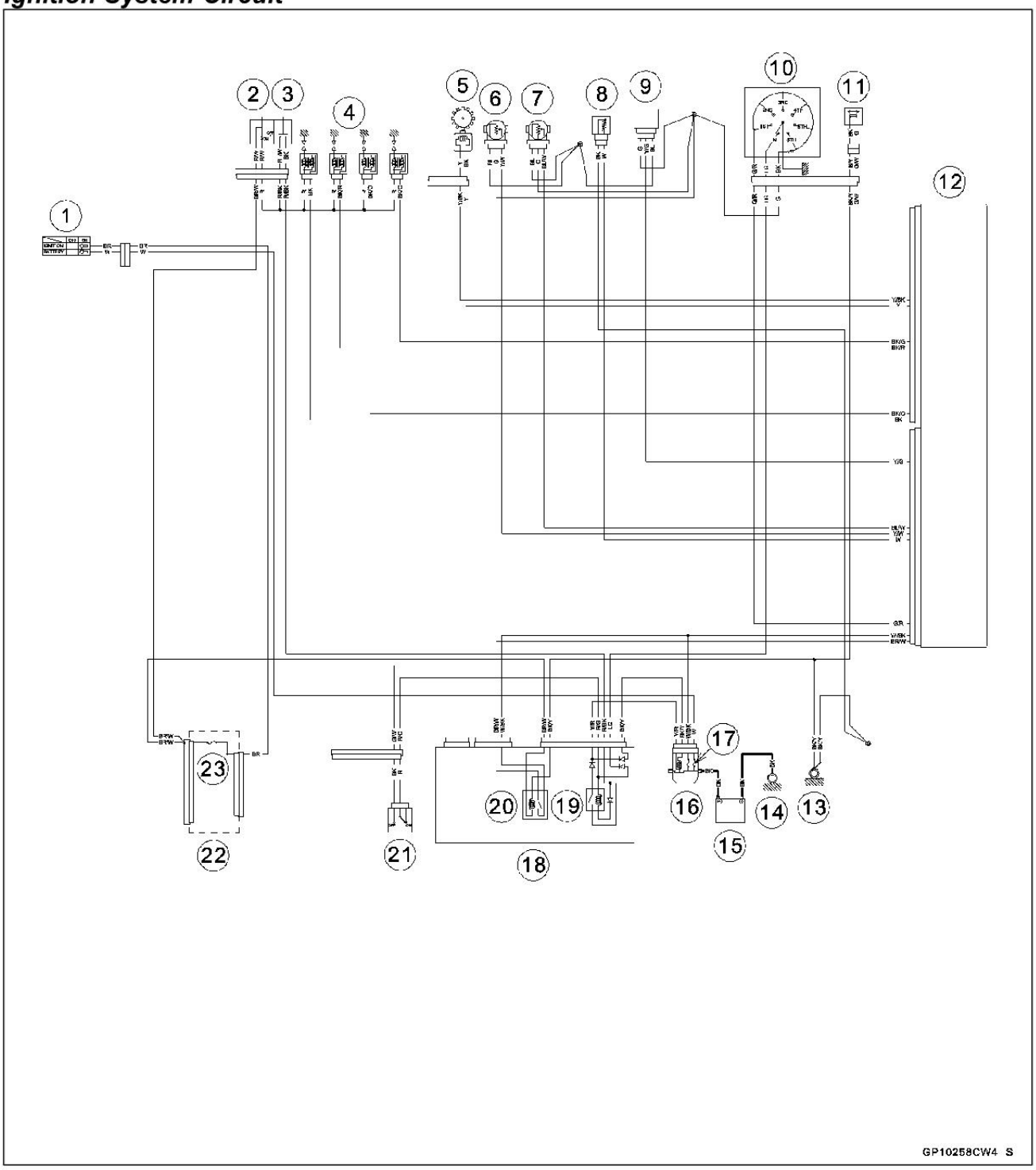
## Ignition System

### Ignition System Troubleshooting



## Ignition System

### *Ignition System Circuit*



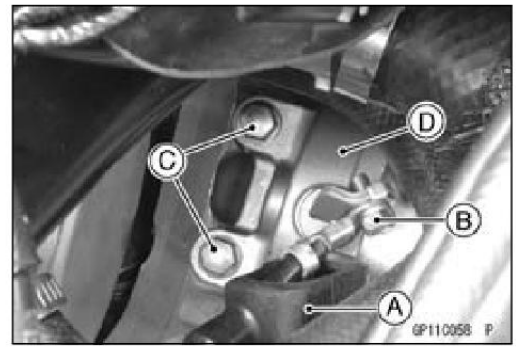

1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Stick Coils
5. Crankshaft Sensor
6. Main Throttle Sensor
7. Subthrottle Sensor
8. Water Temperature Sensor
9. Vehicle-down Sensor
10. Gear Position Switch
11. Side Stand Switch
12. ECU
13. Frame Ground
14. Engine Ground
15. Battery
16. Starter Relay
17. Main Fuse 30 A
18. Relay Box
19. Starter Circuit Relay
20. ECU Main Relay
21. Starter Lockout Switch
22. Fuse Box (1)
23. Ignition Fuse 15 A

## Electric Starter System

### *Starter Motor Removal*

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Starter Clutch Cover (see Starter Idle Gear Removal(9-32))
- For ABS equipped models, remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal(12-30)).

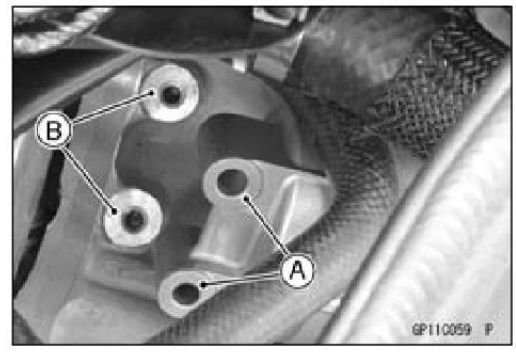
- Slide the rubber cap [A].
- Remove the starter motor cable terminal bolt [B].
- Remove the starter motor mounting bolts [C].
- Remove the starter motor [D] from the right side of the motorcycle.




### *Starter Motor Installation*

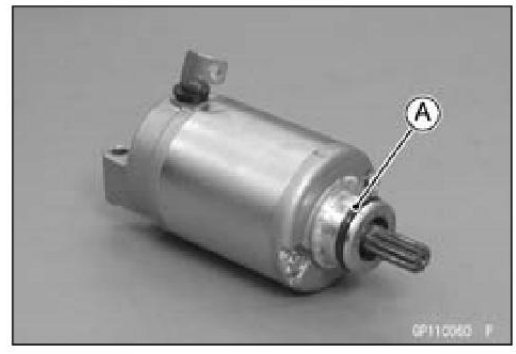
| *NOTICE* |
| --- |
| **Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.** |

- Clean the starter motor legs [A] and crankcase [B] where the starter motor is ground.




- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Tighten the starter motor mounting bolts temporarily.
- Install the starter clutch cover (see Starter Idle Gear Installation(9-32)).
- Tighten:

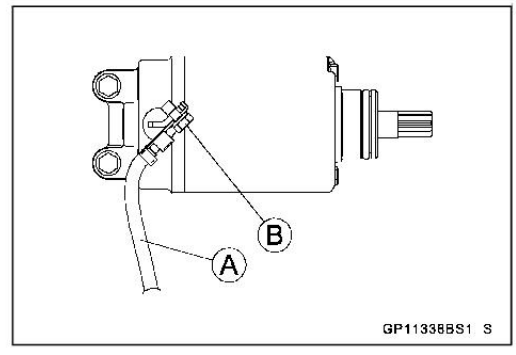
**Torque - Starter Motor Mounting Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**




- Install the starter motor cable [A] as shown.
- Tighten:

**Torque - Starter Motor Cable Terminal Bolt [B]: 3.0 N·m (0.31 kgf·m, 27 in·lb)**

- Install the rubber cap to the original position.
- Install the removed parts.

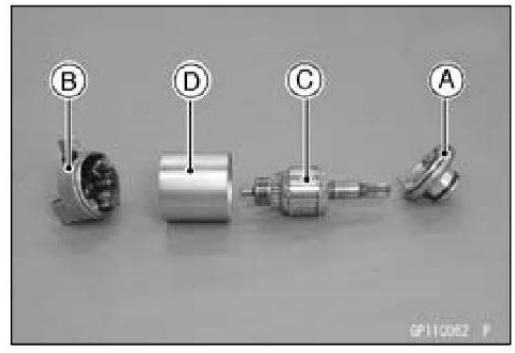


## Electric Starter System

### *Starter Motor Disassembly*

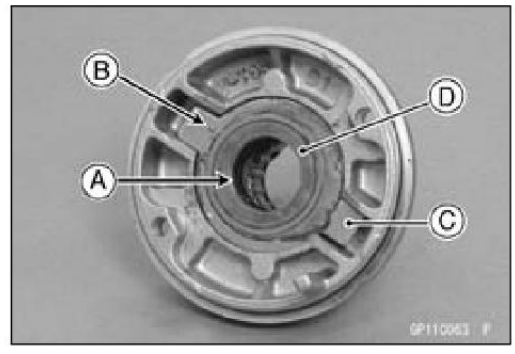
- Remove:
  Starter Motor (see Starter Motor Removal(16-47))
  Starter Motor Through Bolts [A]

- Remove:
  Right-hand End Cover [A]
  Left-hand End Cover [B]
  Armature [C]
  Yoke [D]

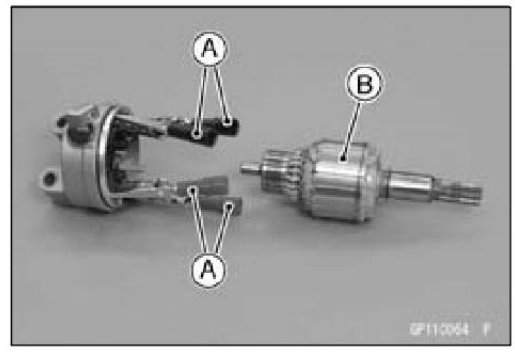



### *Starter Motor Assembly*

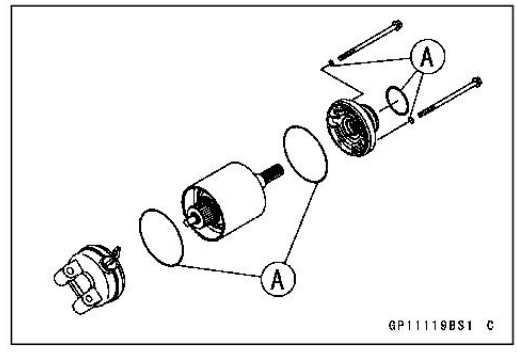
- Apply a thin coat of grease to the oil seal [A].
- Fit the dent [B] of the toothed washer [C] on the projection right-hand end cover.
- Install the washer [D].




- Press the springs holding the brush leads with suitable clips [A] as shown.
- Put the armature [B] among the brushes.

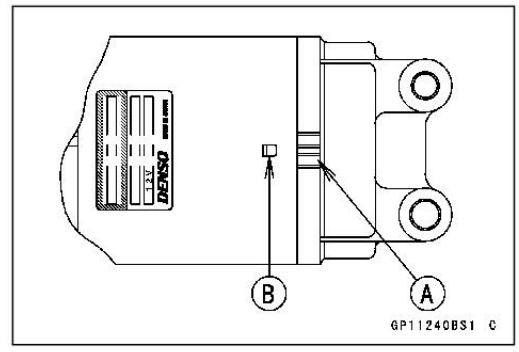



- Replace the O-rings [A] with new ones.
- Install the new O-rings as shown.

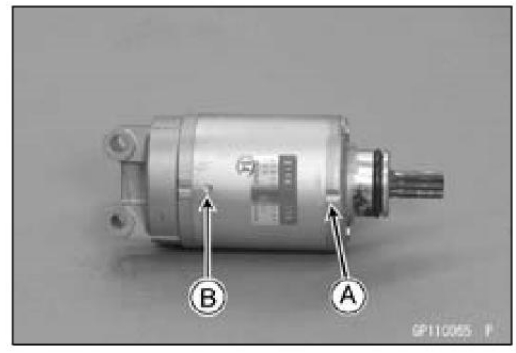


## Electric Starter System

- Align the groove [A] in the left-hand end cover and the hollow mark [B] on the yoke.




- Align the hollow mark [A] on the right-hand end cover and the hollow mark [B] on the yoke.



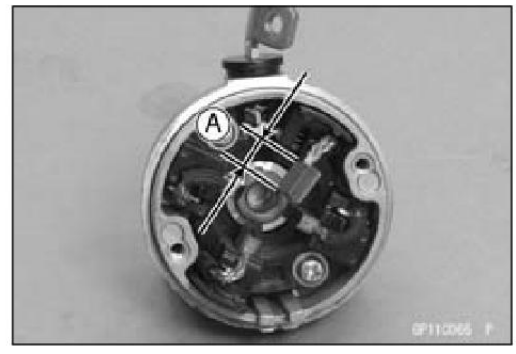

### *Brush Inspection*

- Measure the length [A] of each brush.
- ★If any is worn down to the service limit, replace the left -hand end cover assembly.

**Starter Motor Brush Length**

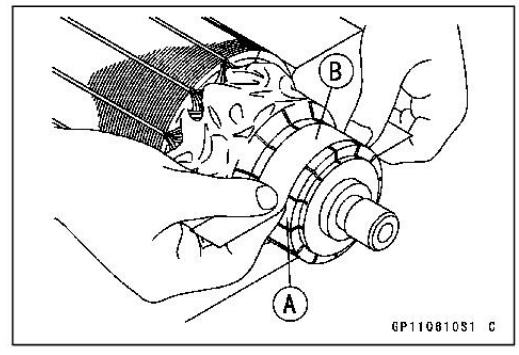
**Standard: 7 mm (0.28 in.)**

**Service Limit: 5 mm (0.20 in.)**




### *Commutator Cleaning and Inspection*

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.

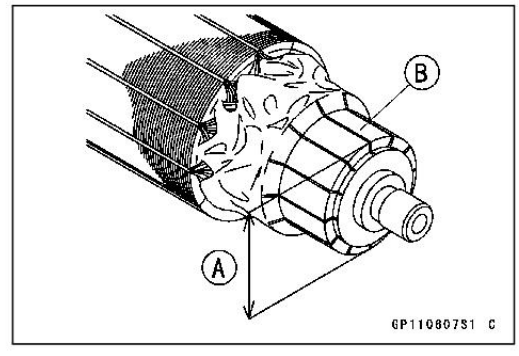



- Measure the diameter [A] of the commutator [B].
- ★If the commutator diameter is less than the service limit, replace the starter motor with a new one.

**Commutator Diameter**

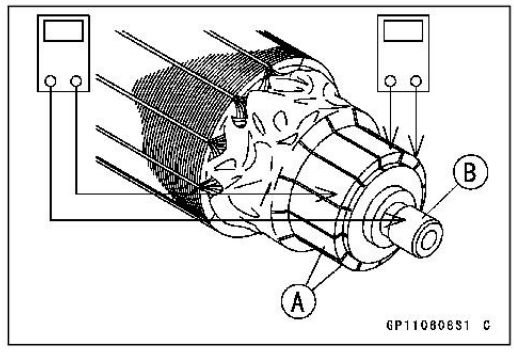
**Standard: 24 mm (0.94 in.)**

**Service Limit: 23 mm (0.91 in.)**



## Electric Starter System

### *Armature Inspection*




- Using a digital meter measure the resistance between any two commutator segments [A].

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

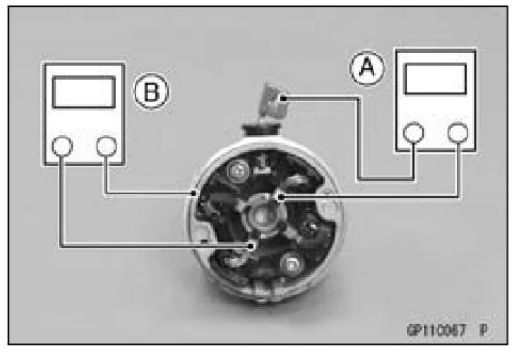
- Using a digital meter, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

**NOTE**

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the digital meter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

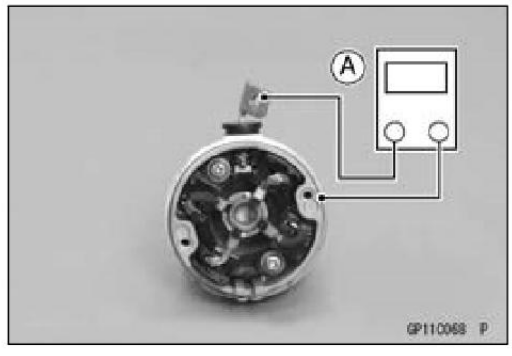
### *Brush Lead Inspection*




- Using a digital meter, measure the resistance as shown.
  Terminal and Positive Brush [A]
  Left-hand End Cover and Negative Brush [B]

★If there is not close to zero ohms, the brush lead has an open. Replace the left-hand end cover assembly.

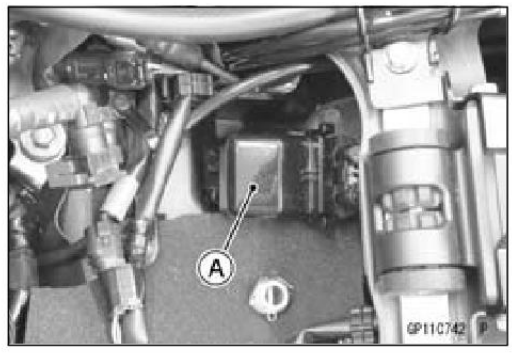
### *Left-hand End Cover Assembly Inspection*




- Using a digital meter, measure the resistance as shown.
  Terminal and Left-hand End Cover [A]

★If there is any reading, the left-hand end cover assembly have a short. Replace the left-hand end cover assembly.

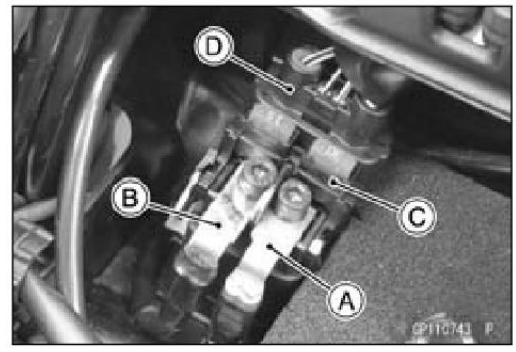
### *Starter Relay Inspection*




- Remove the battery negative (–) cable from the battery negative (–) terminal (see Battery Removal(16-24)).
- Remove the fuel tank (see Fuel Tank Removal(3-38)).
- Remove the starter relay cover [A].

## Electric Starter System

- Disconnect the starter motor cable [A] and battery positive (+) cable [B].
- Remove the starter relay [C] from the rear fender.
- Disconnect the starter relay connector [D].



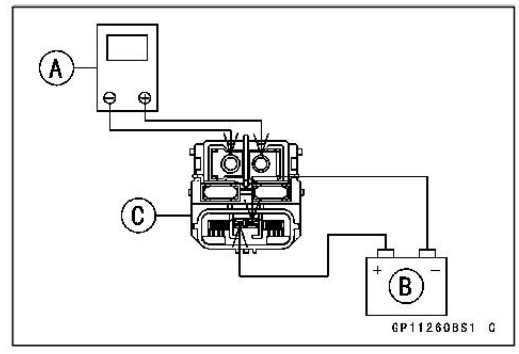

- Connect a digital meter [A] and 12 V battery [B] to the starter relay [C] as shown.

★If the relay does not work as specified, the relay is defective. Replace the starter relay.

**Testing Relay**

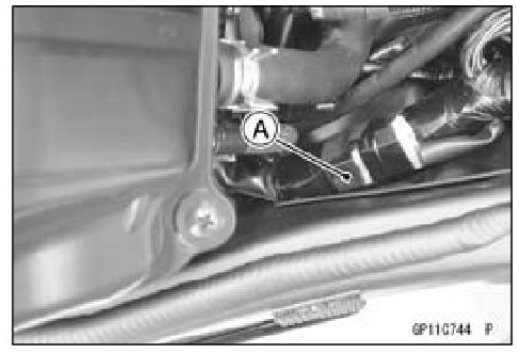
**Criteria:** **When battery is connected → 0 Ω**

**When battery is disconnected → ∞ Ω**



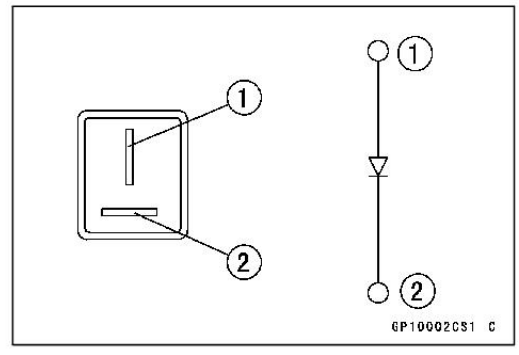

### *Rectifier Inspection*

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Rectifier [A]



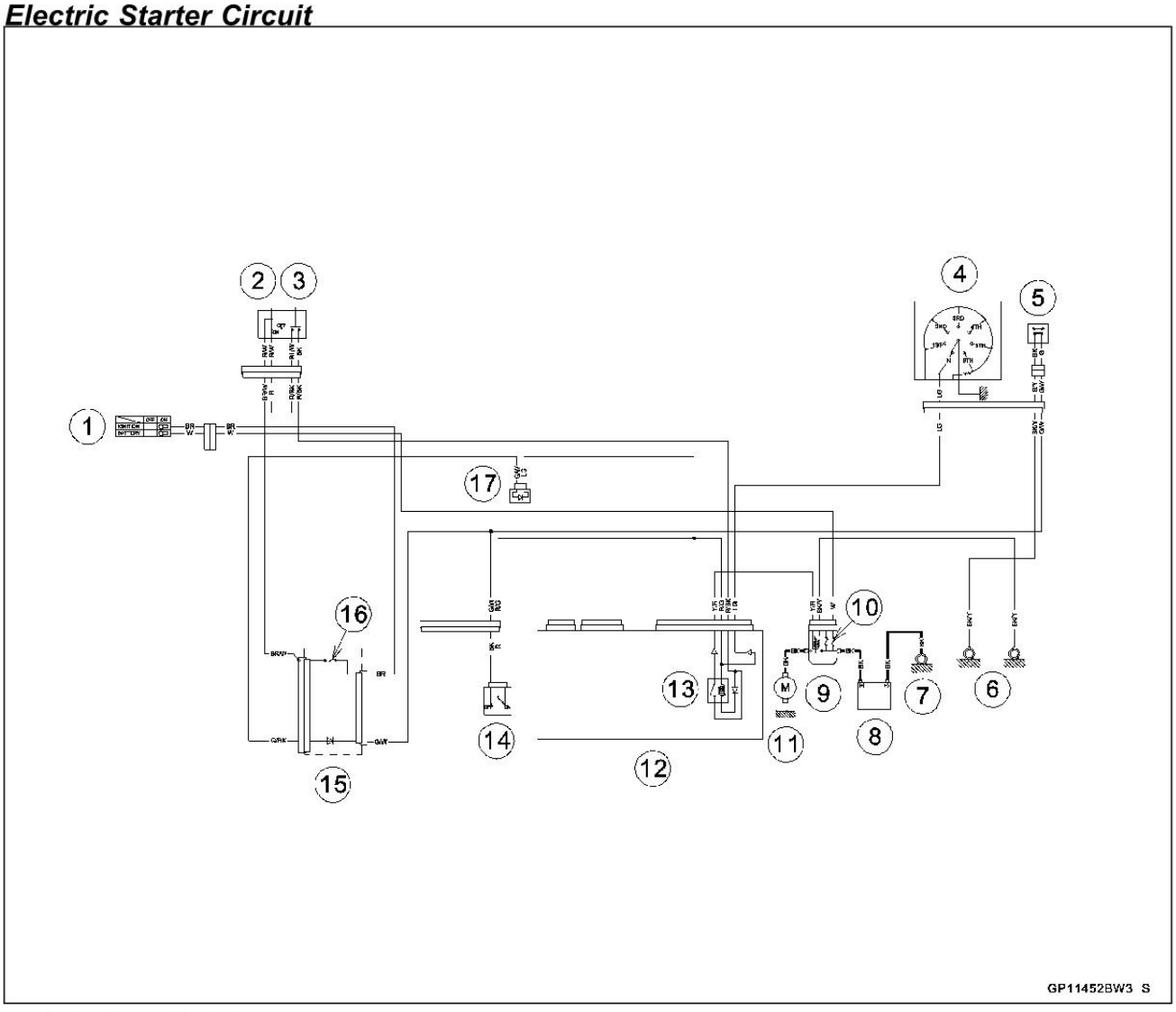

- Set a digital meter, and check conductivity of the terminals in the diode.
  Anode
  Cathode

★The resistance should be low in one direction and more than ten times as much in the other direction. If the rectifier shows low or high in both directions, the rectifier is defective and the rectifier must be replaced.



## Electric Starter System

### *Electric Starter Circuit*




1. Ignition Switch
2. Engine Stop Switch
3. Starter Button
4. Gear Position Switch
5. Side Stand Switch
6. Frame Grounds
7. Engine Ground
8. Battery
9. Starter Relay
10. Main Fuse 30 A
11. Starter Motor
12. Relay Box
13. Starter Circuit Relay
14. Starter Lockout Switch
15. Fuse Box (1)
16. Ignition Fuse 15 A
17. Rectifier

## Lighting System

### *Headlight Beam Horizontal Adjustment*

- Refer to the Headlight Aiming Inspection (see Headlight Aiming Inspection(2-61)).

### *Headlight Beam Vertical Adjustment*

- Refer to the Headlight Aiming Inspection (see Headlight Aiming Inspection(2-61)).

### *Headlight Unit Removal*

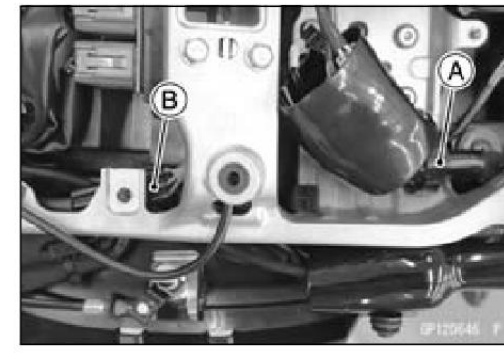
- Refer to the Upper Fairing Disassembly (see Upper Fairing Disassembly(15-17)).

### *Headlight Unit Installation*

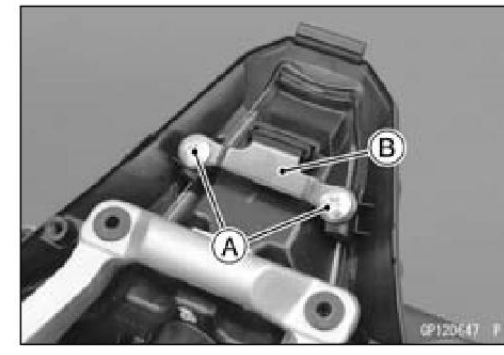
- Refer to the Upper Fairing Assembly (see Upper Fairing Assembly(15-17)).

### *Brake/Tail Light Removal*

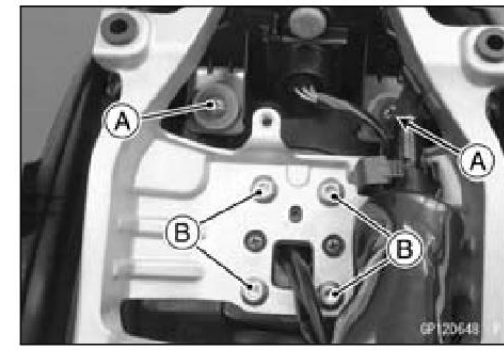
- Remove:
  Brake/Tail Light Cover (see Rear Fender Removal(15-24))
  Exhaust Butterfly Valve Actuator with cables and connectors connected (see Exhaust Butterfly Valve Actuator Removal(5-46))
- Open the clamp [A].
- Disconnect the brake/tail light connector [B].




- Remove:
  Screws [A]
  Bracket [B]



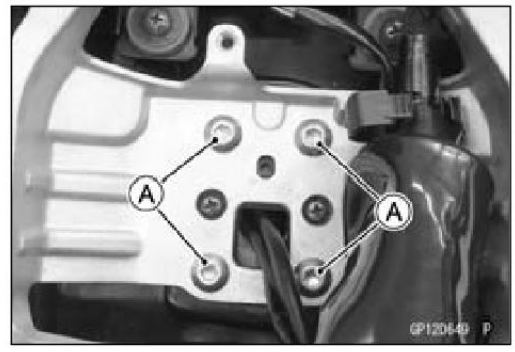

- Remove:
  Brake/Tail Light Screws [A]
  Bolts [B]
- Bring down the flap assembly and rear fender.
- Remove the brake/tail light.



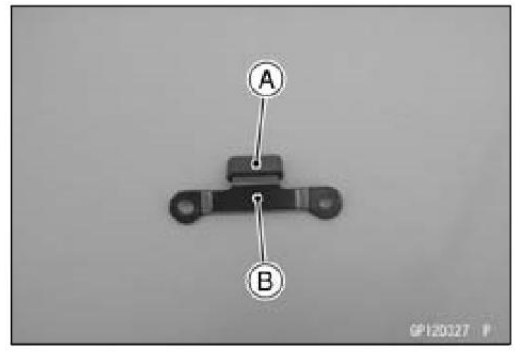

### *Brake/Tail Light Installation*

- Installation is the reverse of removal.

- Replace the flap mounting bolts [A] with new ones.




- Install the damper [A] to the bracket [B].
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).




### *License Plate Light Removal*

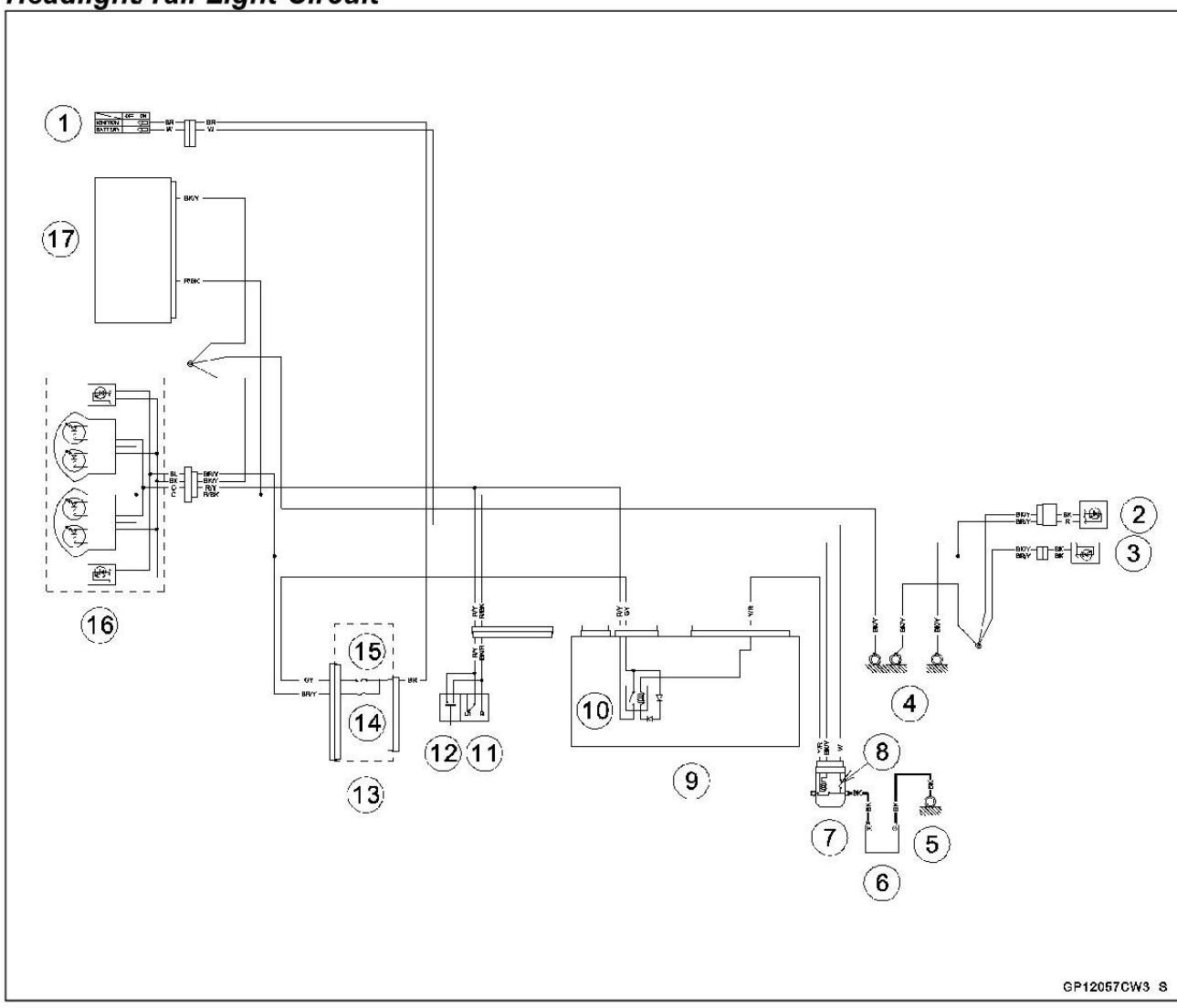
- Refer to the Flap Disassembly (see Flap Disassembly(15-27)).

### *Licence Plate Light Installation*

- Refer to the Flap Assembly (see Flap Assembly(15-28)).

## Lighting System

### *Headlight/Tail Light Circuit*




1. Ignition Switch
2. Brake/Tail Light
3. License Plate Light
4. Frame Grounds
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. Relay Box
10. Headlight Circuit Relay
11. Dimmer Switch
12. Passing Button
13. Fuse Box (1)
14. Brake Light/Horn Fuse 7.5 A
15. Headlight Fuse 15 A
16. Headlight Unit
17. Meter Unit

## Lighting System

### *Front Turn Signal Light Removal*

- Refer to the middle inner Fairing Disassembly (see Middle Inner Fairing Disassembly(15-14)).

### *Front Turn Signal Light Installation*

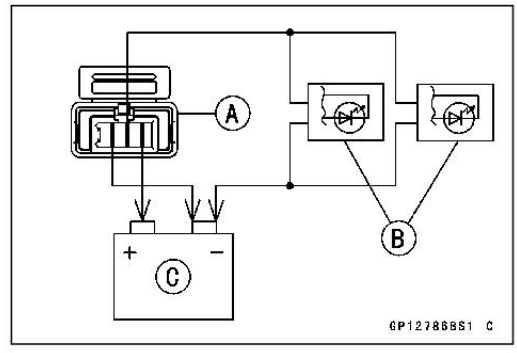
- Refer to the middle inner Fairing Assembly (see Middle Inner Fairing Assembly(15-15)).

### *Turn Signal Relay Inspection*

- Remove the battery (see Battery Removal(16-24)).
- Pull out the turn signal relay [A] upward, and remove it from the rear fender.
- Disconnect the connector.

- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not blink as specified, replace the turn signal relay.



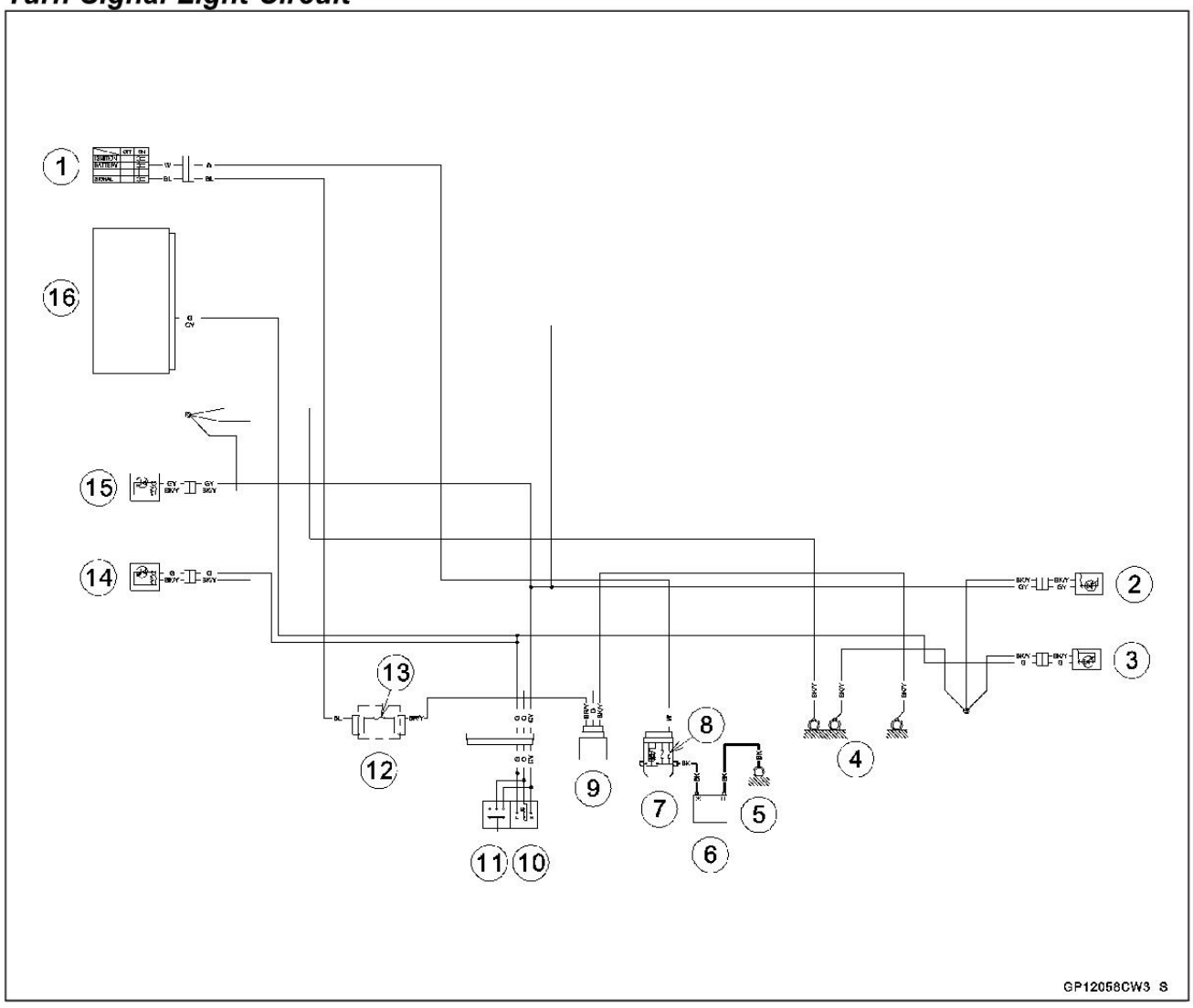

**Testing Turn Signal Relay**

| Load | | Blinking Times (c/m*) |
|---|---|---|
| The Number of Turn Signal Lights | Wattage (W) | |
| 1** | 3.5 | 150 – 250 |
| 2 | 7 | 75 – 95 |

(*): Cycle(s) per minute
(**): Correspond to “one light burned out.”

## Lighting System

### *Turn Signal Light Circuit*




1. Ignition Switch
2. Rear Right Turn Signal Light
3. Rear Left Turn Signal Light
4. Frame Grounds
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. Turn Signal Relay
10. Turn Signal Switch
11. Hazard Button
12. Fuse Box (2)
13. Turn Signal Relay Fuse 7.5 A
14. Front Left Turn Signal Light
15. Front Right Turn Signal Light
16. Meter Unit

## Air Switching Valve

### *Air Switching Valve Operation Test*

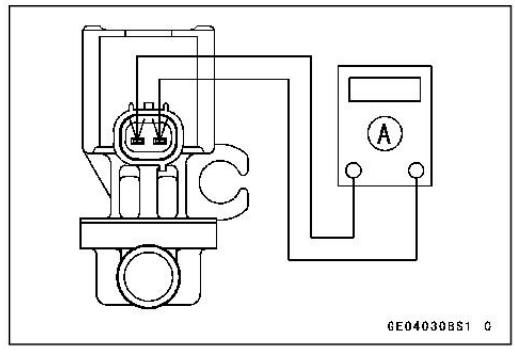
- Refer to the Air Suction System Damage Inspection (see Air Suction System Damage Inspection(2-34)).

### *Air Switching Valve Unit Test*

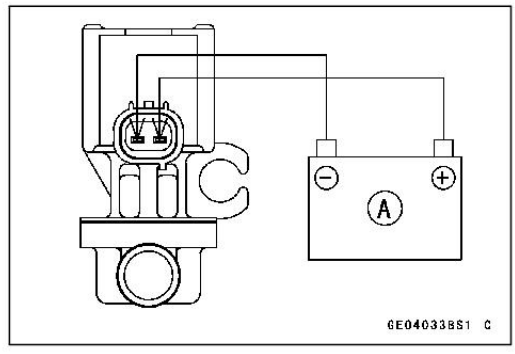
- Remove the air switching valve (see Air Switching Valve Removal(5-12)).
- Connect a digital meter [A] to the air switching valve terminals as shown.

**Air Switching Valve Resistance**
**Standard: 20 – 24 Ω @20°C (68°F)**

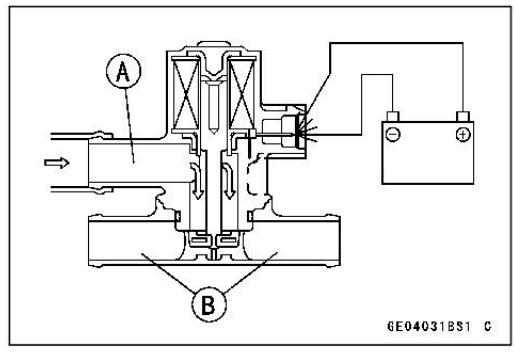
★If the resistance reading is out of the specified value, replace it with a new one.




- Connect the 12 V battery [A] to the air switching valve terminals as shown.




- Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].

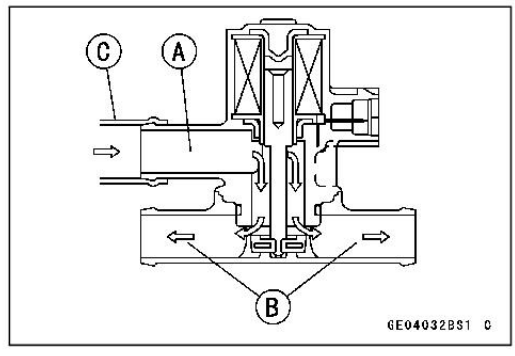



- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].

★If the air switching valve dose not operate as described, replace it with a new one.

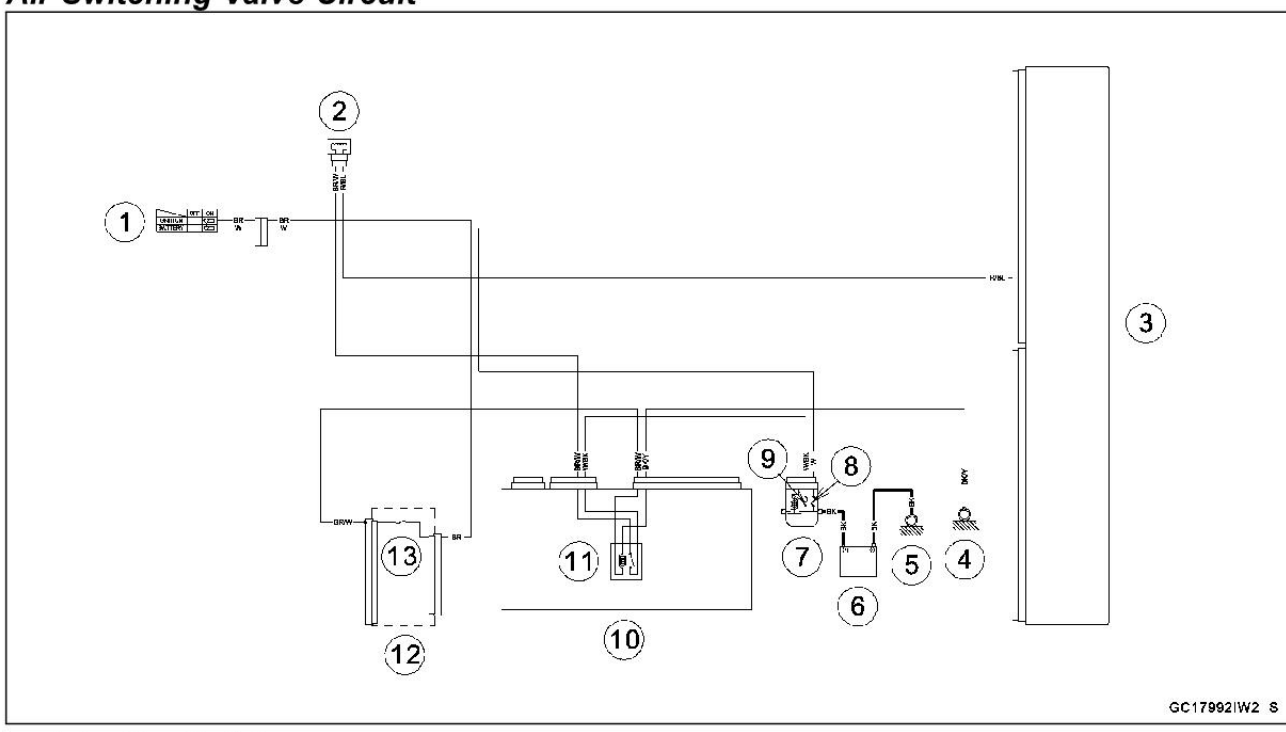
**NOTE**

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].*



## Air Switching Valve

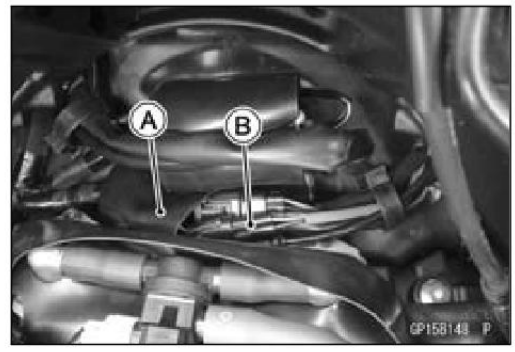
### *Air Switching Valve Circuit*




1. Ignition Switch
2. Air Switching Valve
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Radiator Fan System

### *Radiator Fan Motor Inspection*

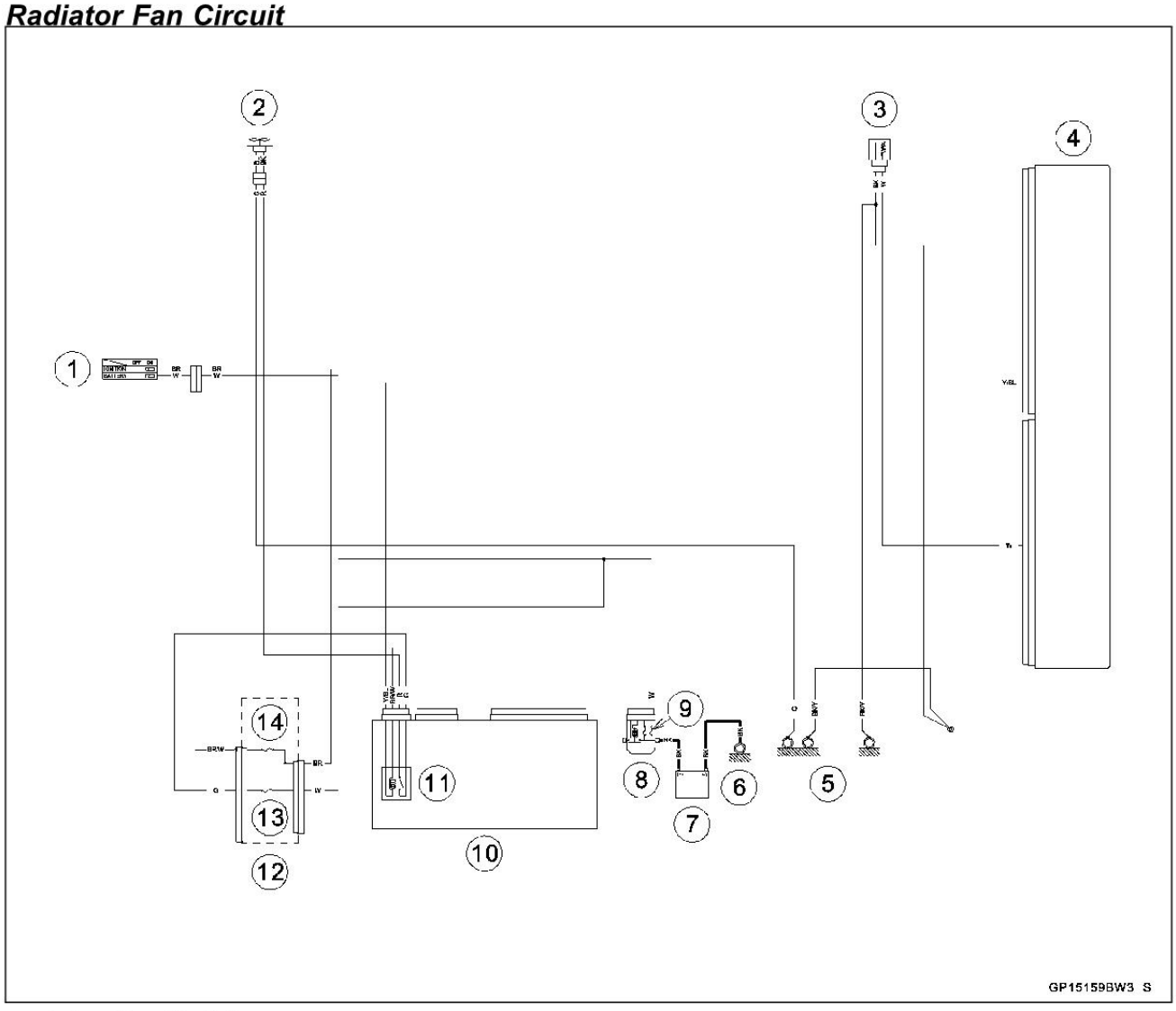



- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Slide the dust cover [A].
- Disconnect the connector [B].
- Using an auxiliary leads, supply battery power to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.

## Radiator Fan System

### *Radiator Fan Circuit*

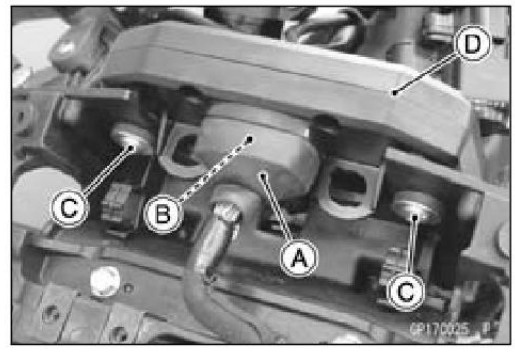



1. Ignition Switch
2. Radiator Fan Motor
3. Water Temperature Sensor
4. ECU
5. Frame Grounds
6. Engine Ground
7. Battery
8. Starter Relay
9. Main Fuse 30 A
10. Relay Box
11. Radiator Fan Relay
12. Fuse Box (1)
13. Radiator Fan Fuse 15 A
14. Ignition Fuse 15 A

## Meter, Gauge, Indicator Unit

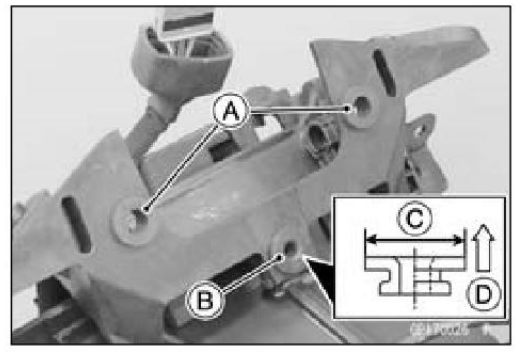
### *Meter Unit Removal*

- Remove the meter cover (see Meter Cover Removal(15-19)).
- Slide the dust cover [A], and disconnect the meter unit connector [B].
- Remove:
  Screws [C]
  Meter Unit [D]

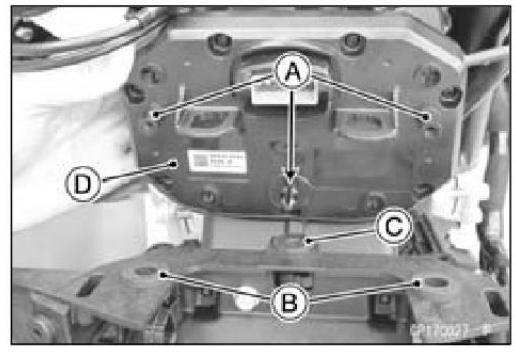



### *Meter Unit Installation*

- Installation is the reverse of removal.
- Install:
  Dampers [A]
- Install the grommet [B] with its larger diameter side [C] facing upward [D], if removed.




- Insert the projections [A] into the dampers [B] and grommet [C] to install the meter unit [D].
- Install the removed parts.



## Meter, Gauge, Indicator Unit

### *Meter Operation Inspection*

**Check 1-1: Meter Unit Switching Inspection**

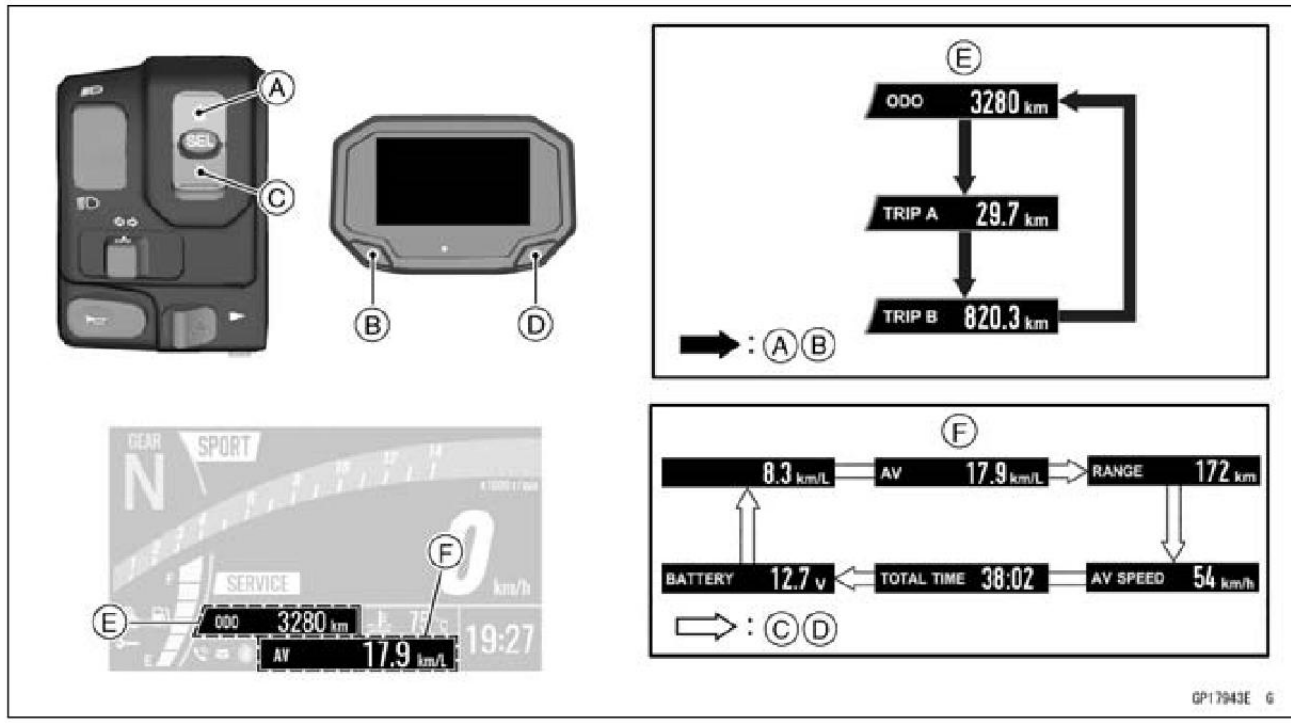
- Turn the ignition switch on and check the followings.

**Display Mode Setting**

- By pushing the upper button [A] or left meter button [B], and lower button [C] or right meter button [D] each time, check if the multifunction display [E] and [F] changes as shown.

**NOTE**

- *Check the meter function with each handlebar button and meter button. If there is a functional problem, determine that the problem existing on which handlebar button or meter button before inspect the meter unit.*
- *For the handlebar switch inspection, refer to the tables in the Wiring Diagram.*



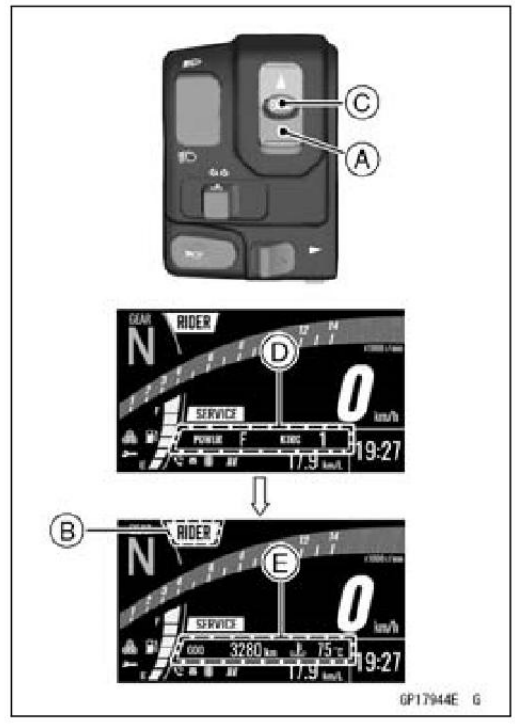
## Meter, Gauge, Indicator Unit

**Check 1-2: Left Switch Housing Switching Inspection**

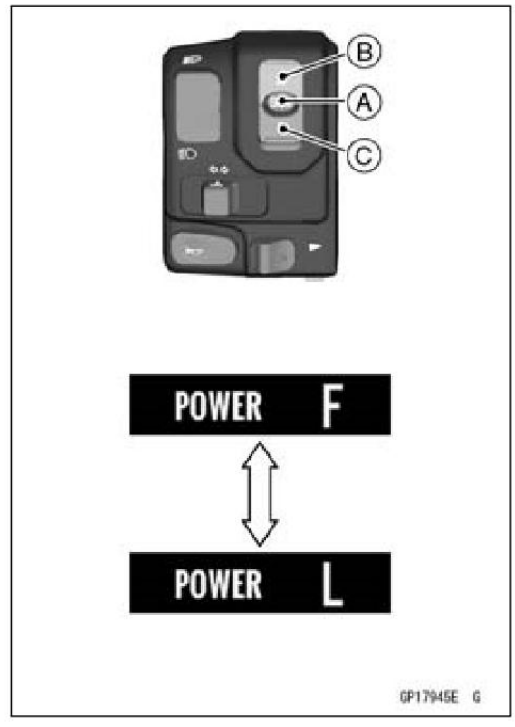
- Turn the ignition switch on.
- While the riding mode is RAIN mode, and the throttle grip is fully closed, push and hold the lower button [A] to select the RIDER mode [B].
- By pushing and hold the “SEL” button [C], check that the parameter display mode [D] can be changed to the multi-function display [E].
- By pushing the ”SEL” button, check the multifunction display can be changed to the parameter display mode.

★If the modes does not changed, check the following parts.
”SEL” Button (see Switch Inspection(16-98))
Lower Button (see Switch Inspection(16-98))
Wiring (see Meter Circuit (ZX636J)(16-75)) (see Meter Circuit (ZX636K)(16-76))

★If the above parts is good, replace the meter unit and/or ECU.




- Turn the ignition switch on.
- Select the RIDER mode.
- By pushing the “SEL” button [A], check that the display blinks Power mode.
- By pushing the upper button [B] or lower button [C] to select the Power mode, and push the ”SEL” button.

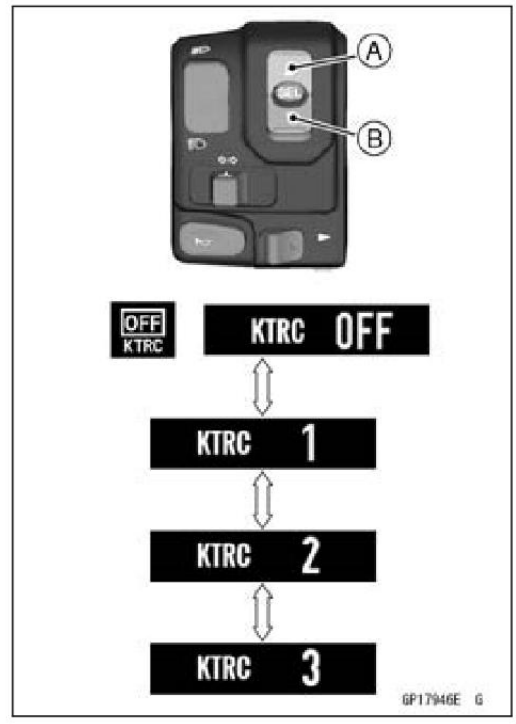


## Meter, Gauge, Indicator Unit

- By pushing the upper button [A] or lower button [B] each time, check that the KTRC mode indicator changes.

★If the modes do not change or "–" blinks, check the following parts.
"SEL" button (see Switch Inspection(16-98))
Upper Button or Lower Button (see Switch Inspection(16-98))
Wiring (see Meter Circuit (ZX636J)(16-75)) (see Meter Circuit (ZX636K)(16-76))

★If the above parts is good, replace the meter unit and/or ECU.

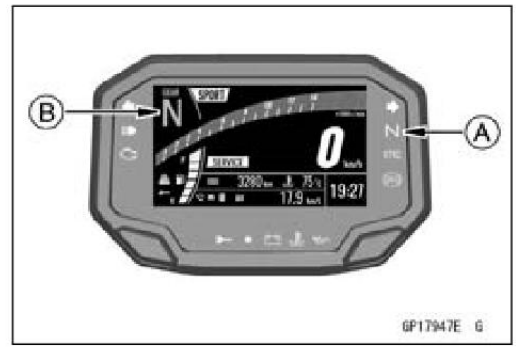



### *Meter System Inspection*

**Check 2-1: Gear Position Indicator Inspection**

- Turn the ignition switch on and shift the transmission gear into neutral position.

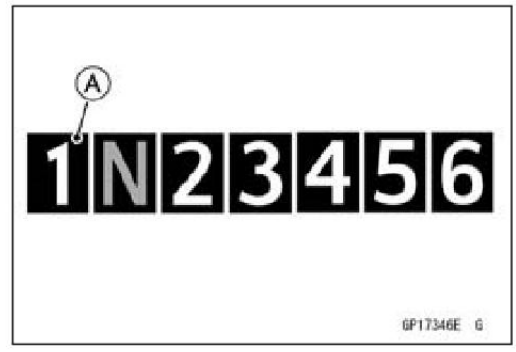
○The green neutral indicator light [A] goes on, and the gear position indicator is displayed the "N" mark [B].




- Set the low gear position, and check that the display changes from "N" to "1" mark [A] and the green neutral indicator light goes off.
- Using a suitable stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand or start the engine, and change the gear position.
- Check that the display corresponding to each gear position (1, N, 2, 3, 4, 5 or 6) appears.

★If the display function does not work, check the following parts.
Gear Position Sensor (see DTC P0914(17-81)) (see DTC P0915(17-82)) (see DTC P0916(17-82))
Wiring (see Meter Circuit (ZX636J)(16-75)) (see Meter Circuit (ZX636K)(16-76))

★If the above parts are good, replace the meter unit and/or ECU.

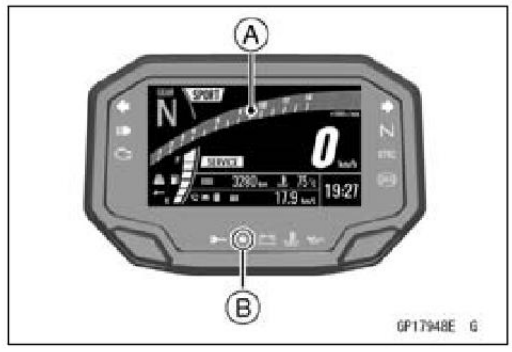


## Meter, Gauge, Indicator Unit

### Check 2-2: Ambient Brightness Sensor Inspection

**NOTE**

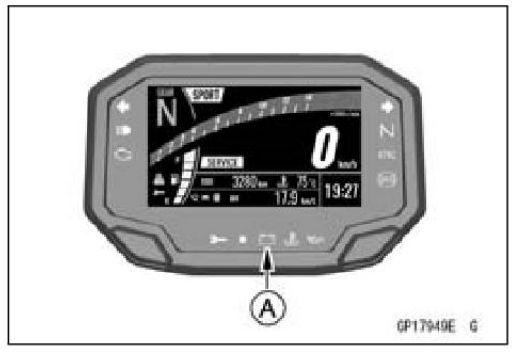
○*This meter unit has the automatically tachometer brightness function by the sensor in addition to the manual brightness setting.*




- Turn the ignition switch on.
- Check if the meter brightness [A] should change by shining a light on the sensor [B] with a penlight or covering the sensor with your finger.

★If the meter does not work properly, replace the meter unit.

### Check 2-3: Red Battery Warning Indicator Light Inspection




- When the battery condition is low voltage (10.8 – 11.2 V or less) or high voltage (15.5 – 16.5 V or more), the red battery warning indicator light [A] goes on.

★If the red battery warning indicator light goes on, inspect the charging voltage (see Charging Voltage Inspection(16-34)).

★If the charging voltage is good, replace the meter unit.

### Check 2-4: Clock Inspection

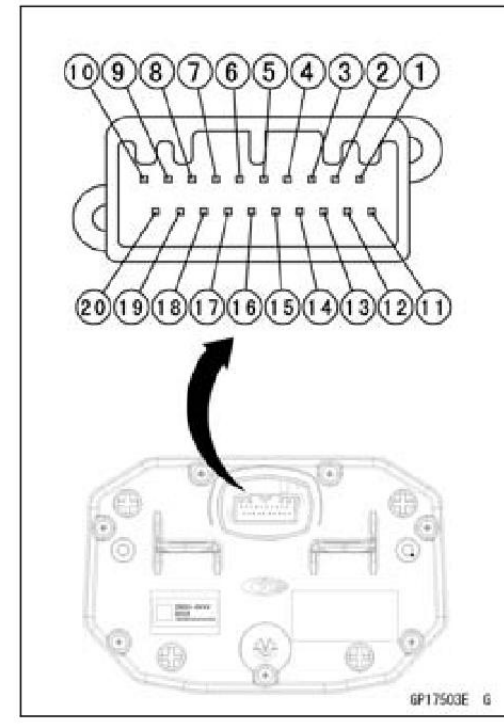
- Turn the ignition switch on.
- Change the multifunction display to the clock.
- Record the time.
- Turn the ignition switch off, and then turn the ignition switch on after a few minutes.
- Check that the clock was counting time while turning the ignition switch off.

★If the meter does not work, replace the meter unit.

## Meter, Gauge, Indicator Unit

### *Meter Unit Inspection*

● Remove the meter unit (see Meter Unit Removal(16-62)).




[1] Battery (+)
[2] Ignition (+)
[3] Ground (–)
[4] Green Neutral Indicator (–)
[5] Red Oil Pressure Warning Indicator Light (–)
[6] Yellow ABS Indicator (–) (Equipped Models)
[7] Yellow KTRC Indicator (–)
[8] ECU Communication Line
[9] Speed Sensor Signal
[10] Tachometer Signal
[11] Fuel Level Sensor
[12] KIBS Warning Message (–)
[13] Green Left Turn Signal Indicator (+)
[14] Green Right Turn Signal Indicator (+)
[15] Blue High Beam Indicator (+)
[16] Unused
[17] Unused
[18] External Communication Line (for Diagnostic System)
[19] Left Switch Housing Upper Button (–)
[20] Left Switch Housing Lower Button (–)

***NOTICE***

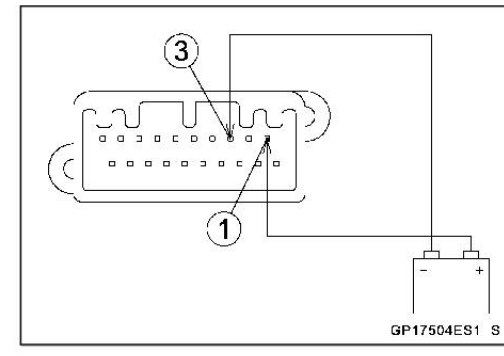
**Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter unit is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminal.**

**Check 3-1: Meter Unit Primary Operation Check**

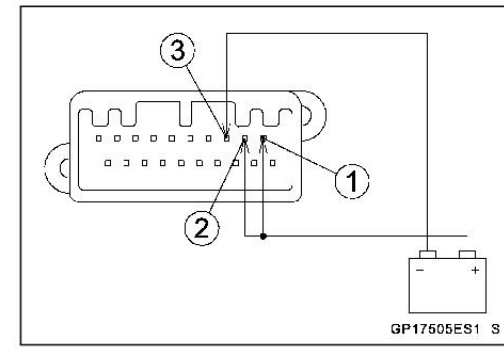
● Using the auxiliary leads, connect the 12 V battery to the meter unit connector as follows.

○Connect the battery positive (+) terminal to the terminal [1].

○Connect the battery negative (–) terminal to the terminal [3].




● Connect the terminal [2] to the battery (+) terminal.



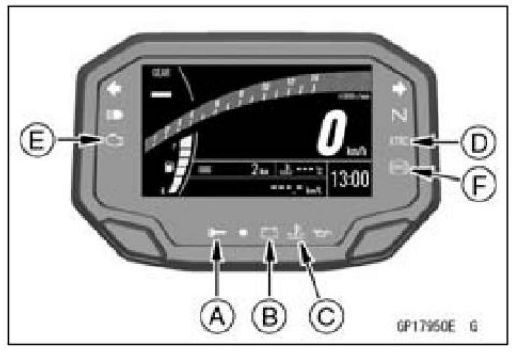
## Meter, Gauge, Indicator Unit

● Check the following items.

○Following indicator lights are go on for few seconds, then turn off.
Red Immobilizer Warning Indicator Light [A] (Equipped Models)
Red Battery Warning Indicator Light [B]
Red Coolant Temperature Warning Light [C]
Yellow KTRC Indicator Light [D]

○Following indicators are remains on.
Yellow Engine Warning Indicator Light [E]
Yellow ABS warning indicator light [F] (Equipped Models)

★If the meter unit does not work properly, replace the meter unit.

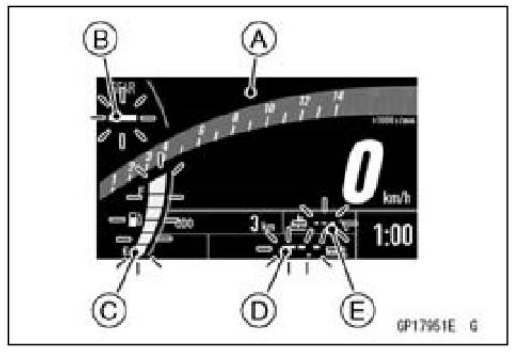



**NOTE**

○*This meter unit has a failure detection function of the communication. When the communication error was detected, the meter unit alerts the rider by the yellow engine warning indicator light and/or yellow ABS indicator light remains on.*

● The meter display [A] should turns on after few seconds later from turning on the meter unit.

○Some meters display such as followings will blinking to tell the error which have missing the input signals by removing the meter.
Gear Position Indicator Display with "-" [B]
Fuel Level Gauge Segments [C]
Multifunction Display with "- -" [D]
Coolant Temperature Meter with "- -" [E]




**NOTE**

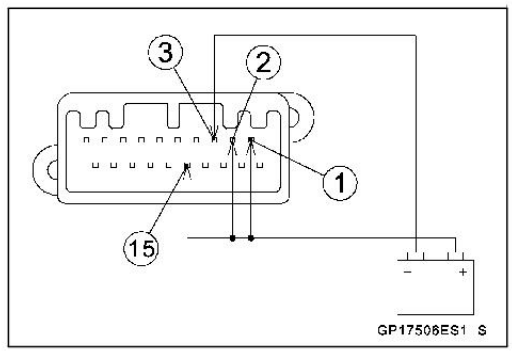
○*Some meter display will show alarts with blinking the segments or blinking "-" in spite of the meter unit is normal, because the input signals to the meter unit are missing when the meter unit has been removed.*

★If the fuel level gauge does not work properly, replace the meter unit.

**Check 3-2: Blue High Beam Indicator Light Inspection**

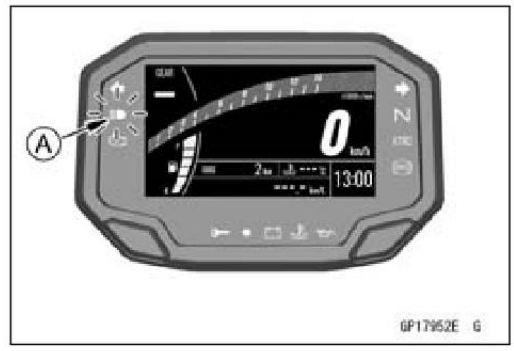
● Connect the leads in the same circuit as Check 3-1.

● Connect the terminal [15] to the battery (+) terminal.



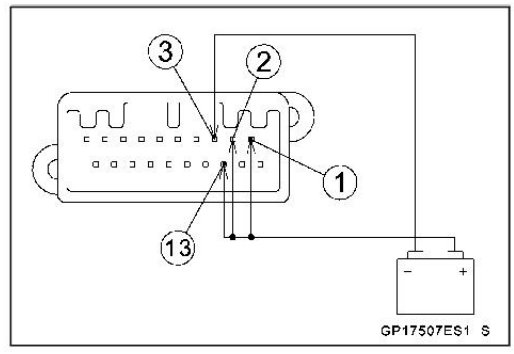
## Meter, Gauge, Indicator Unit

● Check that the blue high beam indicator light [A] goes on.
★ If the indicator light does not go on, replace the meter unit.

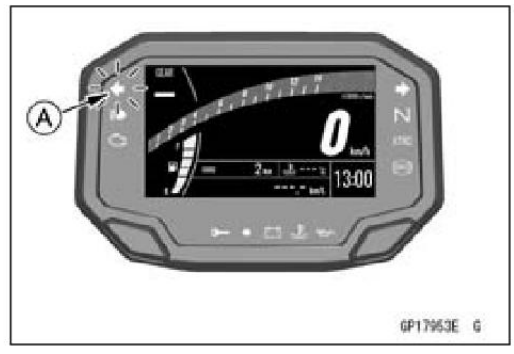



**Check 3-3: Green Turn Signal Indicator Lights Inspection**

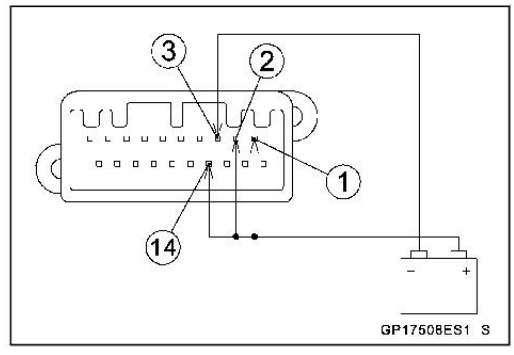
● Connect the leads in the same circuit as Check 3-1.
● Connect the terminal [13] to the battery (+) terminal.




● Check that the green left turn signal indicator light [A] goes on.
★ If the indicator light does not go on, replace the meter unit.



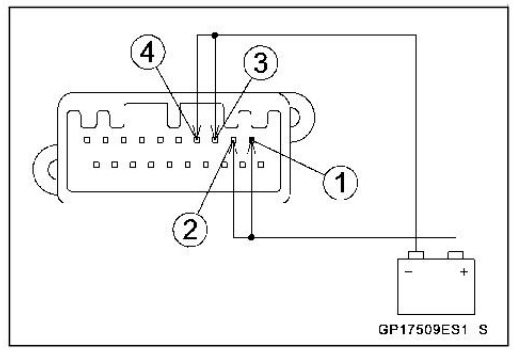

● Connect the leads in the same circuit as Check 3-1.
● Connect the terminal [14] to the battery (+) terminal.




● Check that the green right turn signal indicator light [A] goes on.
★ If the indicator light does not go on, replace the meter unit.

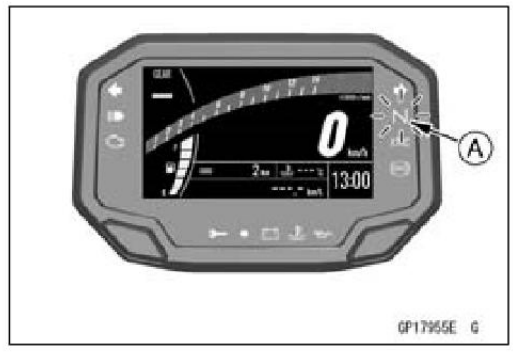
## Meter, Gauge, Indicator Unit

**Check 3-4: Green Neutral Indicator Light Inspection**
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [4] to the battery (–) terminal.

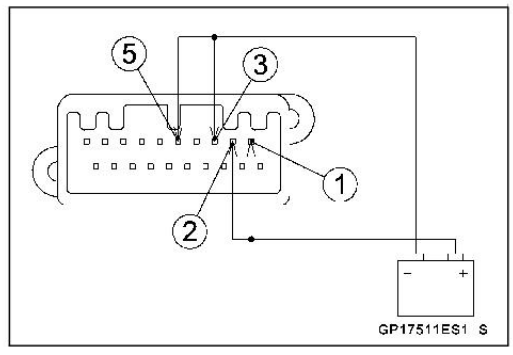



- Check that the green neutral indicator light [A] goes on.

★If the indicator light does not go on, replace the meter unit.

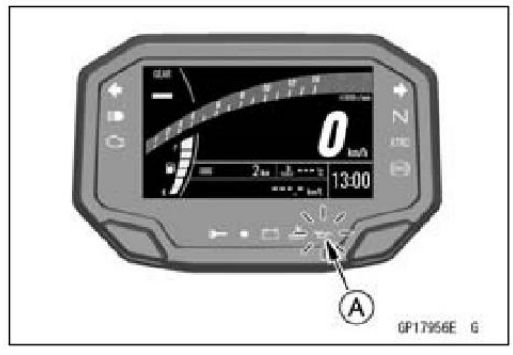



**Check 3-5: Red Oil Pressure Warning Indicator Light Inspection**
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [5] to the battery (–) terminal.



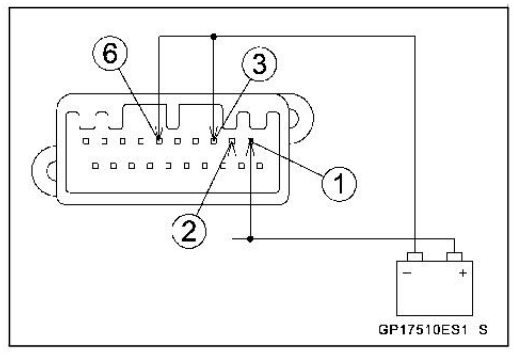

- Check that the red oil pressure warning indicator light [A] goes on.

★If the indicator light does not go on, replace the meter unit.




**Check 3-6: Yellow ABS Indicator Light Inspection (Equipped Models)**
- Connect the leads in the same circuit as Check 3-1.

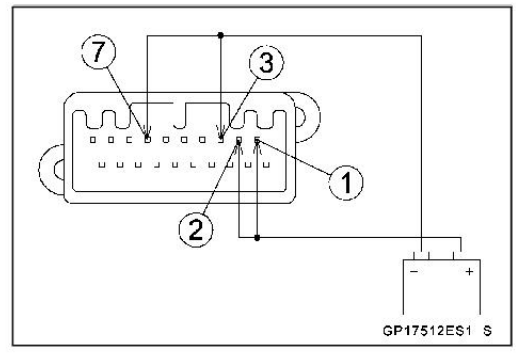
○The yellow ABS indicator light goes on.
- Connect the terminal [6] to the battery (–) terminal.



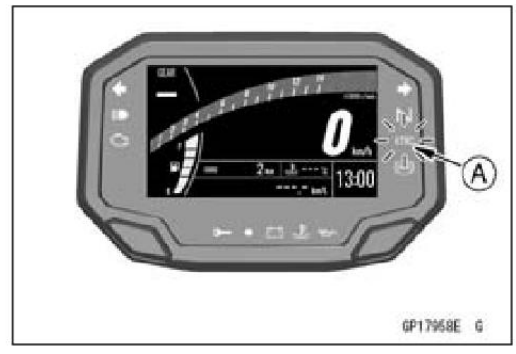
## Meter, Gauge, Indicator Unit

● Check that the yellow ABS indicator light [A] goes off.
★If the indicator light does not go off, replace the meter unit.

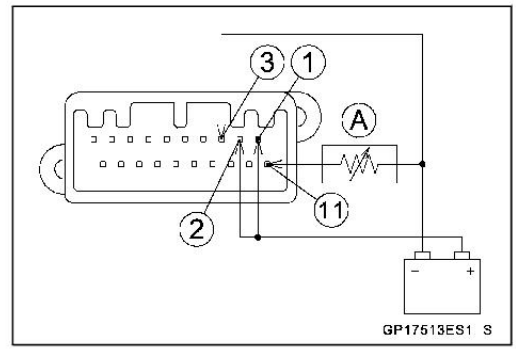
**Check 3-7: Yellow KTRC Indicator Light Inspection**
● Connect the leads in the same circuit as Check 3-1.
● Connect the terminal [7] to the battery (–) terminal.




● Check that the yellow KTRC indicator [A] go on.
★If the indicator does not go on, replace the meter unit.




**Check 3-8: Fuel Gauge Inspection**
● Connect the leads in the same circuit as Check 3-1.
○The all segments of the fuel gauge in the display will blink.
● Connect the variable rheostat [A] between the terminal [11] and the battery (–) terminal.

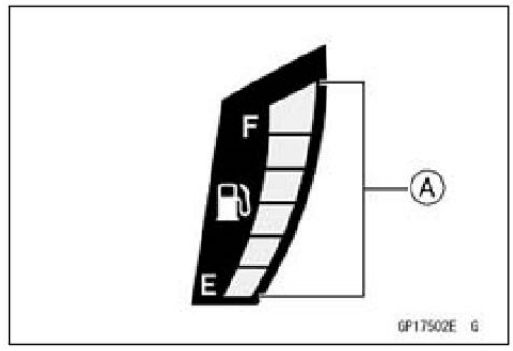


## Meter, Gauge, Indicator Unit

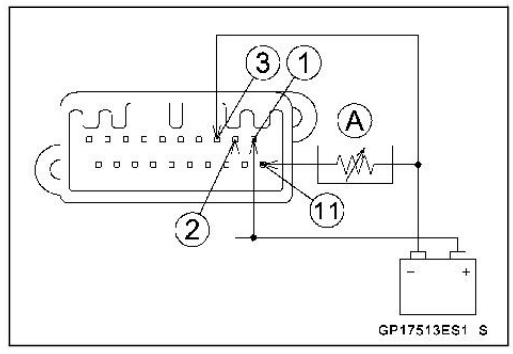
● Check that the number of segments [A] on the fuel gauge matches the resistance value of the variable rheostat.
○After changing the resistance between the terminal [11] and ground, the segment(s) in the fuel gauge should change after 15 seconds.

| Variable Rheostat Resistance (Ω) | Display Segments |
|---|---|
| 35 | 6 segments go on |
| 55 | 5 segments go on |
| 80 | 4 segments go on |
| 105 | 3 segments go on |
| 130 | 2 segments go on |
| 180 | 1 segment goes on |

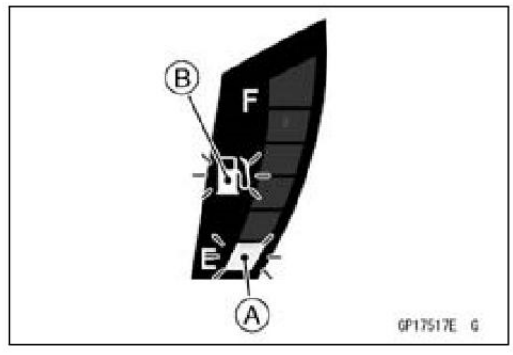
★If the display function does not work properly, replace the meter unit.



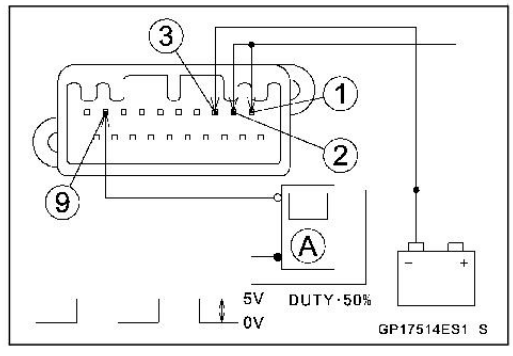

**Check 3-9: Fuel Level Warning Inspection**
● Connect the leads in the same circuit as Check 3-8.
● Increase the resistance to above 200 Ω of the variable rheostat [A] connected between the terminal [11] and the battery (–) terminal.




● Check that the lowest segment [A] and fuel level warning indicator [B] blink.
★If the display function does not work properly, replace the meter unit.




**Check 3-10: Speedometer Inspection**
● Connect the leads in the same circuit as Check 3-1.
● The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [9].
○Indicates approximately 60 km/h if the input frequency is approximately 430 Hz.
○Indicates approximately 50 mph if the input frequency is approximately 580 Hz.
★If the meter function does not work, replace the meter unit.



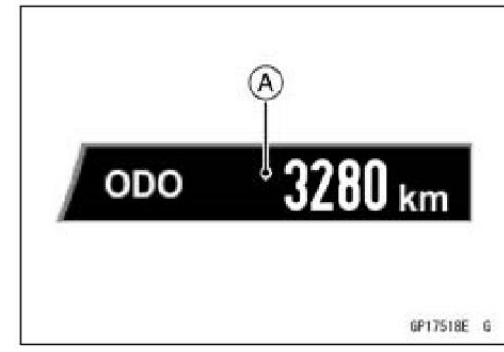

**NOTE**
○*The input frequency of the oscillator adds the integrated value of the odometer.*
○*The integrated value of the odometer cannot be reset.*

## Meter, Gauge, Indicator Unit

**Check 3-11: Odometer Check**

- Check the odometer [A] with the speedometer check in the same way.

★If value indicated in the odometer is not added, replace the meter unit.




**NOTE**

○*The data is maintained even if the battery is disconnected.*

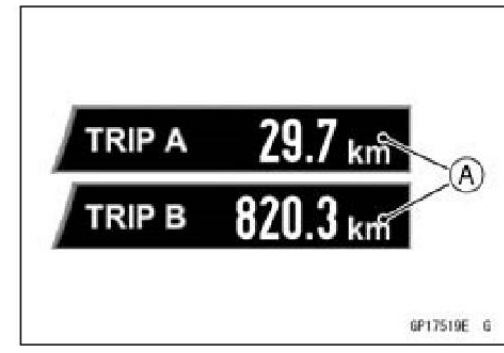
○*When the figures come to 999999, they are stopped and locked.*

○*The integrated value of the odometer cannot be reset.*

**Check 3-12: Trip A/B Meter Check**

- Check the trip meters [A] with the speedometer in the same way.

★If value indicated in the trip meter is not added, replace the meter unit.




**NOTE**

○*The integrated value of the odometer cannot be reset.*

- Check that when the left meter button is pushed for more than two seconds, the figure display turns to 0.0.

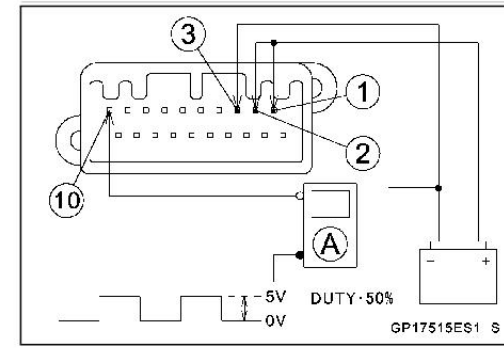
★If the figure display does not indicate 0.0, replace the meter unit.

**Check 3-13: Tachometer Inspection**

- Connect the leads in the same circuit as Check 3-1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [10].

○Indicates approximately 6 000 rpm if the input frequency is approximately 200 Hz.

★If the meter function does not work, replace the meter unit.



## Meter, Gauge, Indicator Unit

**Check 3-14: Other Inspection**

○The following items are displayed while running.
Current Mileage
Average Mileage
Cruising Range
Average Speed
Total Time
ECO Mark

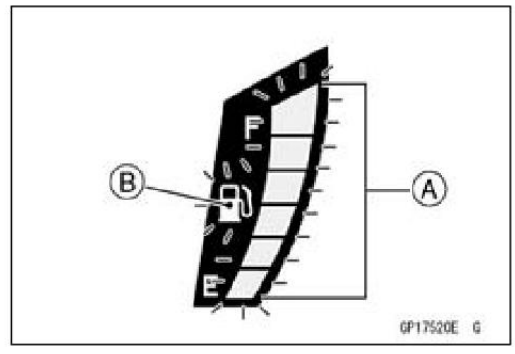
● When the above item is faulty indication check the following items.
Wiring (see Wiring Inspection(16-23))
ECU Communication Line (see ECU Communication Line Inspection (Service Code 39)(17-102))
Fuel Injectors (see DTC P0201, P0202, P0203, P0204(17-107))
Rear Wheel Rotation Sensor(see Front Wheel Rotation Sensor Signal Abnormal Inspection (Service Code 42)(17-140)) (see Rear Wheel Rotation Sensor Signal Abnormal Inspection (Service Code 44)(17-141))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-40))

★If the above items are good, replace the meter unit and/or ECU.

### *Fuel Level Line Self-Diagnosis Mode Inspection*

**NOTE**

○*Usually when the open or short of the fuel level circuit is detected, it becomes the Fuel Level Line Self-Diagnosis Mode.*



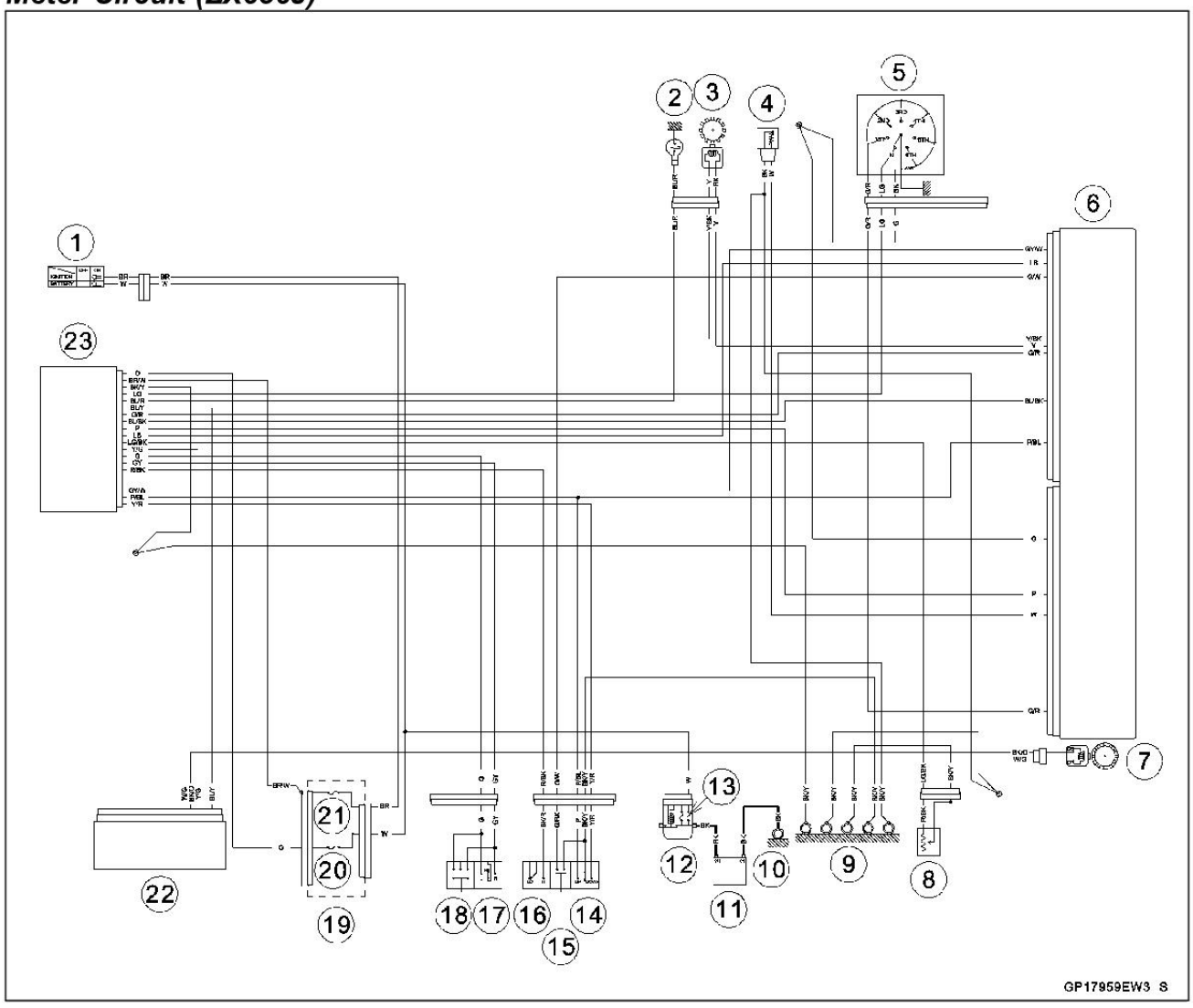

○The all segments [A] of the fuel gauge and fuel level warning indicator [B] in the display will blink. (This function is Fuel Level Line Self-Diagnosis Mode.)

★If the meter enters the self-diagnosis mode when the meter is installed in the motorcycle, check the following items.
Fuel Level Sensor (see Fuel Level Sensor Inspection(16-99))
Wiring (see Wiring Inspection(16-23))

★If the above items are good, replace the meter unit.

## Meter, Gauge, Indicator Unit

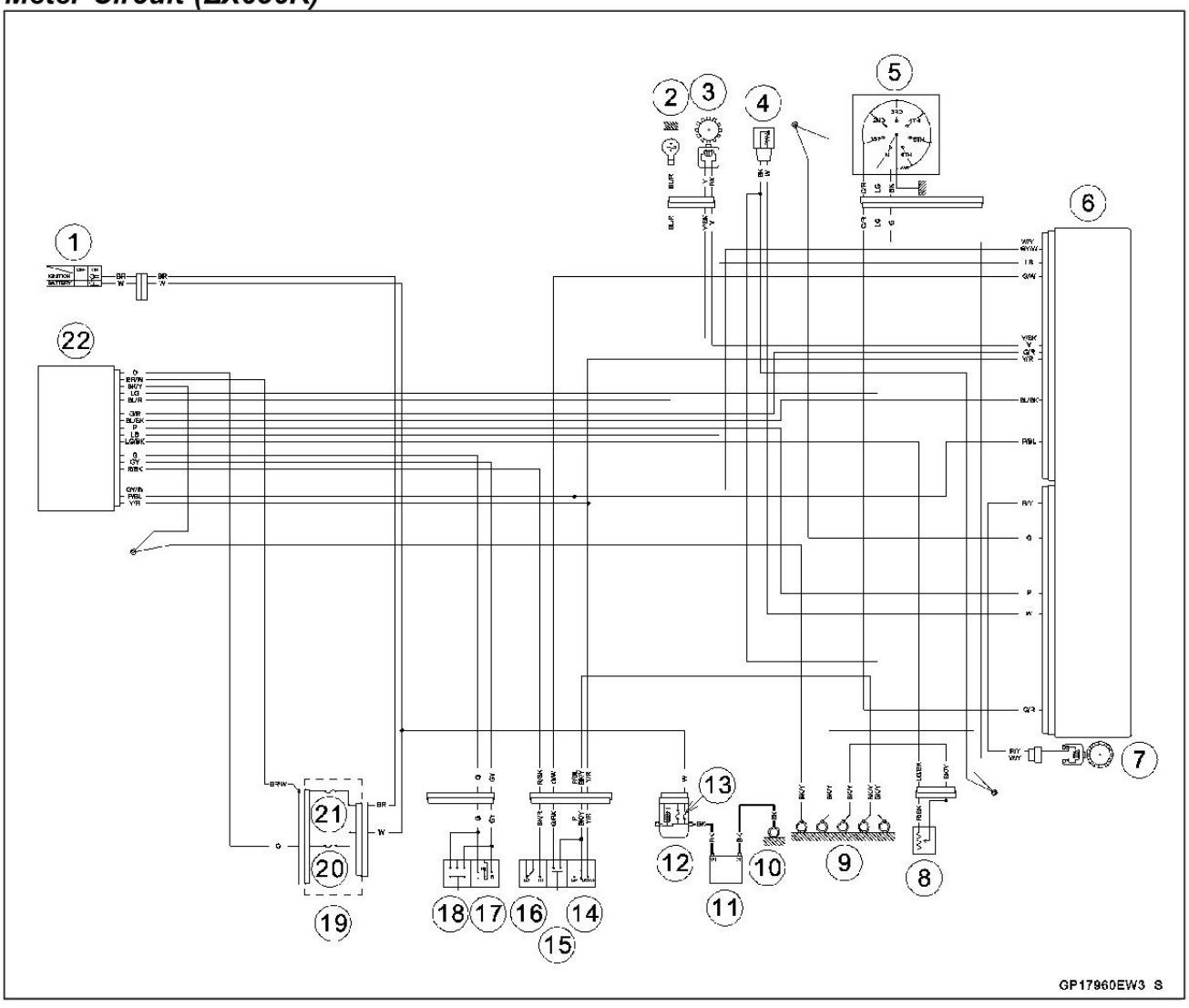
### *Meter Circuit (ZX636J)*




1. Ignition Switch
2. Oil Pressure Switch
3. Crankshaft Sensor
4. Water Temperature Sensor
5. Gear Position Switch
6. ECU
7. Rear Wheel Rotation Sensor
8. Fuel Level sensor
9. Frame Grounds
10. Engine Ground
11. Battery
12. Starter Relay
13. Main Fuse 30 A
14. Upper and Lower Button
15. SEL Button
16. Dimmer Switch
17. Turn Signal Switch
18. Hazard Button
19. Fuse Box (1)
20. Meter Fuse 7.5 A
21. Ignition Fuse 15 A
22. ABS Hydraulic Unit
23. Meter Unit

## Meter, Gauge, Indicator Unit

### *Meter Circuit (ZX636K)*




1. Ignition Switch
2. Oil Pressure Switch
3. Crankshaft Sensor
4. Water Temperature Sensor
5. Gear Position Switch
6. ECU
7. Rear Wheel Rotation Sensor
8. Fuel Level sensor
9. Frame Grounds
10. Engine Ground
11. Battery
12. Starter Relay
13. Main Fuse 30 A
14. Upper and Lower Button
15. SEL Button
16. Dimmer Switch
17. Turn Signal Switch
18. Hazard Button
19. Fuse Box (1)
20. Meter Fuse 7.5 A
21. Ignition Fuse 15 A
22. Meter Unit

## Immobilizer System (Equipped Models)

This motorcycle is equipped with an immobilizer system to protect the motorcycle from theft. This system provides a theft proof device by means of matching a code between the inbuilt key transponder and ECU. If the code does not match, ignition system, injectors, subthrottle valve actuator and exhaust butterfly valve actuator will not operate and the engine will not start.

**Abstract**

- Do not keep more than one immobilizer key of any system on a key ring. Jamming of the key code signal may occur and the operation of the system may be affected.
- The red immobilizer warning indicator light [A] will blink for a period of 24 hours once the ignition switch has been switched off and the key removed. This blinking can be set to on or off as desired by menu mode of the meter unit.
- If all coded keys are lost the ECU and ignition switch will have to be replaced.
- The immobilizer system can not function until the ignition key code is registered in the ECU.
- A total of five keys can be registered in the ECU at any one time.

### *Operational Cautions*

1. Do not put two keys of any immobilizer system on the same key ring.
2. Do not submerge any key in water.
3. Do not expose any key to excessively high temperature.
4. Do not place any key close to magnet.
5. Do not place a heavy item on any key.
6. Do not grind any key or alter its shape.
7. Do not disassemble the plastic part of any key.
8. Do not drop the key and/or apply any shocks to the key.
9. When a ignition key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When the all ignition keys are lost, the user should go to his dealer and have a new ECU installed and register the ignition keys.

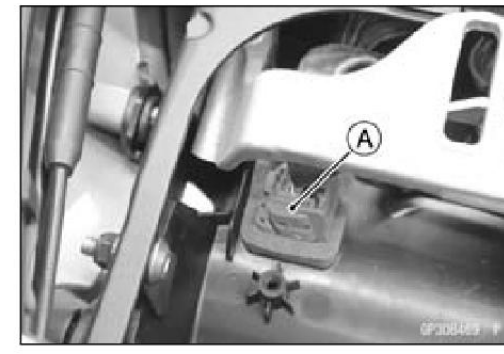
**NOTE**

○*No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.*

### *Key Registration*

**Case 1: When additional spare ignition key is required.**

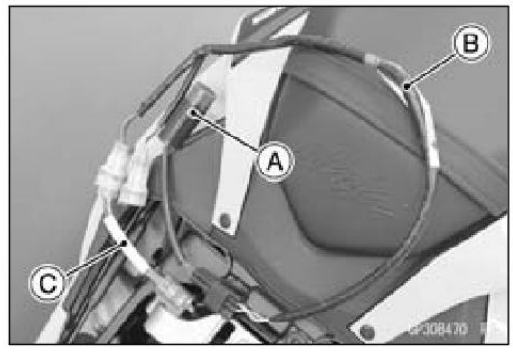
- Prepare a new spare ignition key.
- Cut the key in accordance with the shape of the current ignition key.
- Remove the front seat (see Front Seat Removal(15-8)).
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].

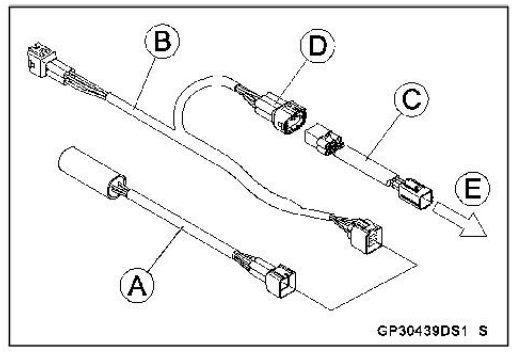


## Immobilizer System (Equipped Models)

● Connect the key registration unit [A], key registration adapter [B] and OBDII adapter cable [C] as shown.
6 Pins Connector [D]
To the main harness [E]

**Special Tools - Key Registration Unit: 57001-1582**
**Key Registration Adapter: 57001-1746**
**OBDII Adapter Cable: 57001-1880**

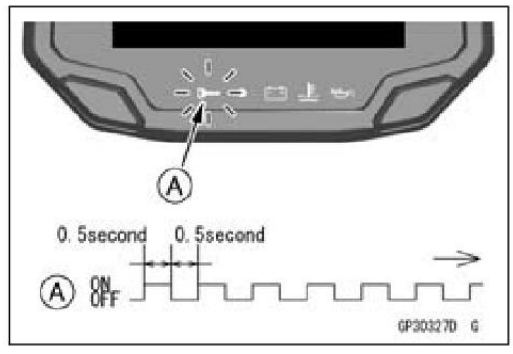



● Insert the registered ignition key to the ignition switch and turn it to “ON.”

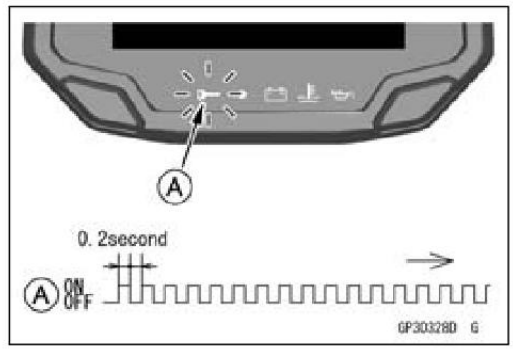
**Verified**

○The red immobilizer warning indicator light [A] blink to display the registration mode (go to the next step).

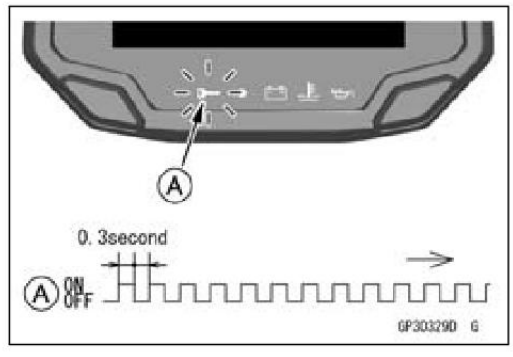



**Not Verified**

○The red immobilizer warning indicator light [A] blink to display the collation error (refer to the following failure illustrations).
Immobilizer Amplifier Failure




Registered Ignition Key Collation Error

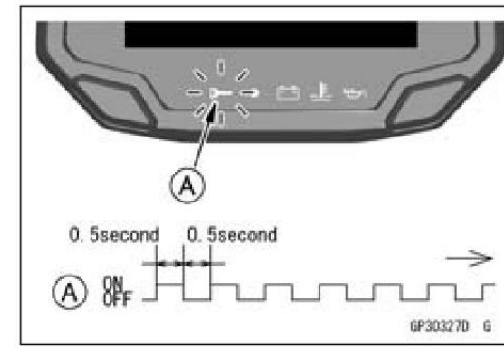


## Immobilizer System (Equipped Models)

● Turn the registered ignition key to “OFF” and remove the registered ignition key.

★If there are other registered ignition keys, they should all do the procedure above.

○The red immobilizer warning indicator light [A] blink continuously to display that the ECU is in the registration mode for 15 seconds.




**NOTE**

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.*

○*To return to the registration mode start the registered ignition key(s) verification procedure. This applies to all ignition key registration.*

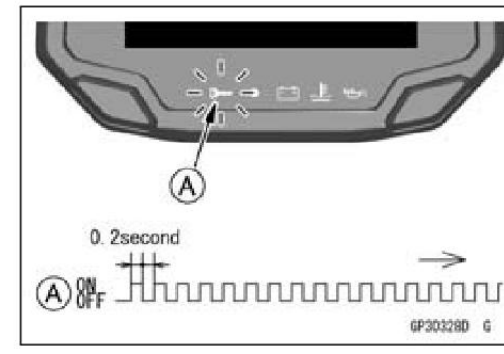
● Insert the ignition key 1 to the ignition switch and turn it to “ON.”

**NOTE**

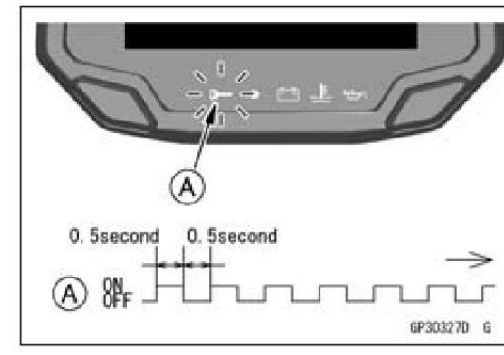
○*Keep the other ignition key away from the immobilizer antenna.*

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blink to display the collation error.

Immobilizer Amplifier Failure

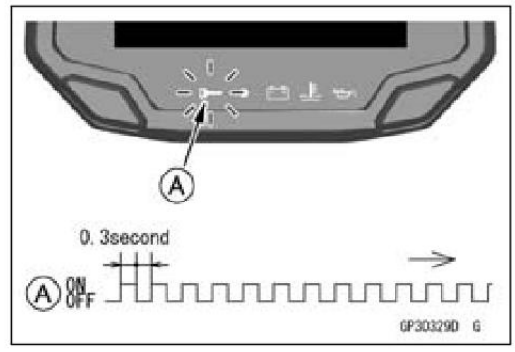



When Registered Ignition Key is Inserted.



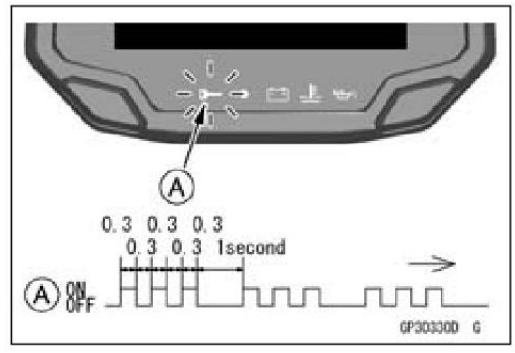
## Immobilizer System (Equipped Models)

Ignition Key Collation Error




- The ignition key 1 is successfully registered in the ECU.

○The red immobilizer warning indicator light [A] blink 3 times and stops for 1 second and then repeats this cycle.




- Turn the ignition key 1 to “OFF” and remove the ignition key 1.

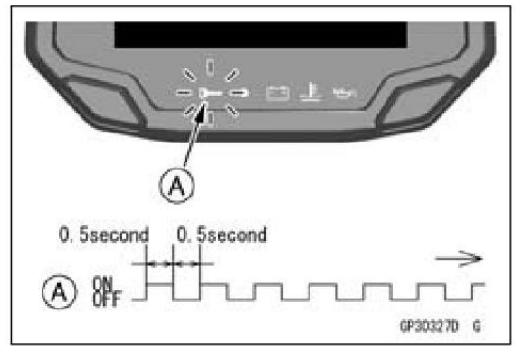
○The red immobilizer warning indicator light [A] blink to display the registration mode.

**NOTE**

○*Turn to “OFF” the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the red immobilizer warning indicator light will switch off.*

○*This procedure registered the registered ignition key and one ignition key.*

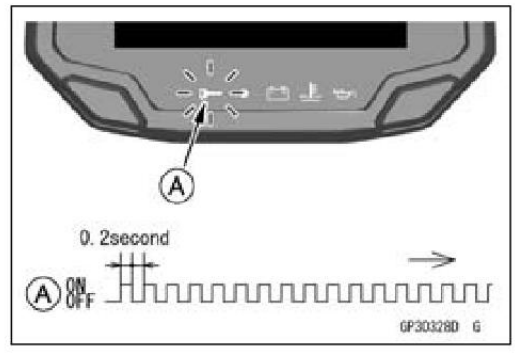
○*Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.*




- Insert the ignition key 2 to the ignition switch and turn it to “ON.”

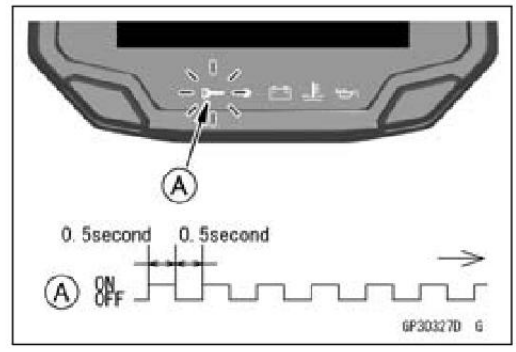
○If there is any problem in the registration, the red immobilizer warning indicator light [A] blink to display the collation error.

Immobilizer Amplifier Failure

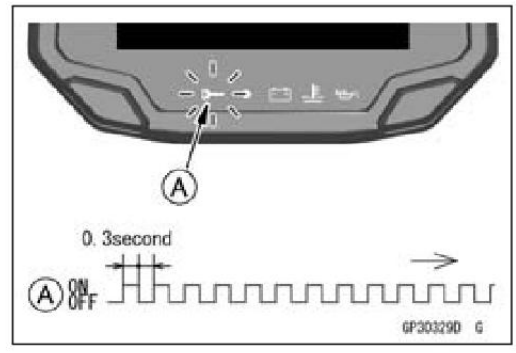


## Immobilizer System (Equipped Models)

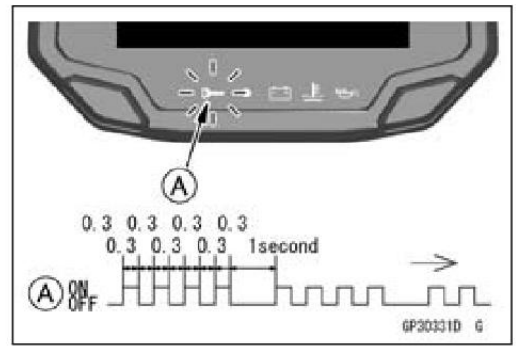
When Registered Ignition Key is Inserted.




Ignition Key Collation Error




- The ignition key 2 is registered in the ECU.
  ○The red immobilizer warning indicator light [A] blink 4 times and stops for 1 second and then repeats this cycle.
  ○This procedure has registered the 2 ignition keys.
- Continue with the procedure to register an additional one ignition key.



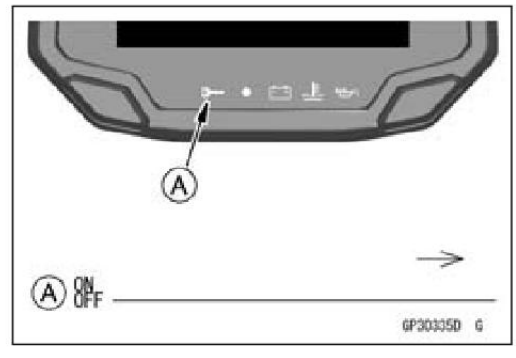

**NOTE**

○*The ECU can store up the five key codes.*

**Red Immobilizer Warning Indicator Light Blink**

| | Indicators Blinks | Indicators Stop | Remarks |
|---|---|---|---|
| **Ignition Key 3** | 5 times | 1 second | Repeat |

- Turn to “OFF” the ignition switch and wait for period of more than 15 seconds.
- The registration mode automatically ends.
- The red immobilizer warning indicator light [A] goes off.



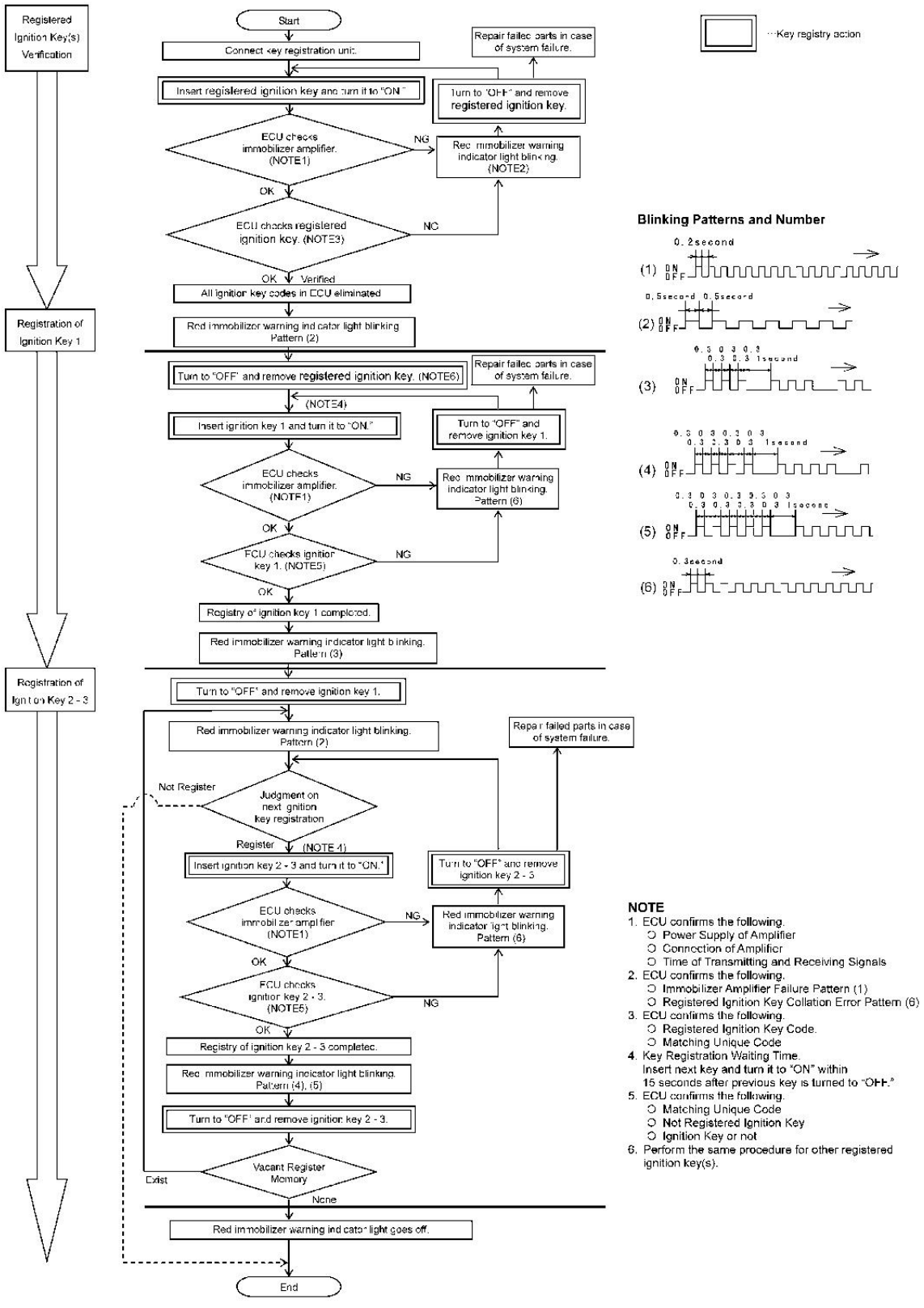

- Remove the special tools and install the immobilizer/Kawasaki diagnostic system connector cap.

**NOTE**

○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

## Immobilizer System (Equipped Models)

### Spare Ignition Key Registration Flow Chart


Registered Ignition Key(s) Verification
Registration of Ignition Key 1
Registration of Ignition Key 2 - 3
Start
Connect key registration unit.
Insert registered ignition key and turn it to "ON."
Repair failed parts in case of system failure.
Turn to "OFF" and remove registered ignition key.
ECU checks immobilizer amplifier. (NOTE1)
NG
Red immobilizer warning indicator light blinking. (NOTE2)
OK
ECU checks registered ignition key. (NOTE3)
NG
OK
Verified
All ignition key codes in ECU eliminated
Red immobilizer warning indicator light blinking Pattern (2)
Turn to "OFF" and remove registered ignition key. (NOTE6)
Repair failed parts in case of system failure.
(NOTE4)
Insert ignition key 1 and turn it to "ON."
Turn to "OFF" and remove ignition key 1.
ECU checks immobilizer amplifier. (NOTE1)
NG
Red immobilizer warning indicator light blinking. Pattern (6)
OK
ECU checks ignition key 1. (NOTE5)
NG
OK
Registry of ignition key 1 completed.
Red immobilizer warning indicator light blinking. Pattern (3)
Turn to "OFF" and remove ignition key 1.
Red immobilizer warning indicator light blinking. Pattern (2)
Repair failed parts in case of system failure.
Not Register
Judgment on next ignition key registration
Register
(NOTE 1)
Insert ignition key 2 - 3 and turn it to "ON."
Turn to "OFF" and remove ignition key 2 - 3
ECU checks immobilizer amplifier (NOTE1)
NG
Red immobilizer warning indicator light blinking. Pattern (6)
OK
ECU checks ignition key 2 - 3. (NOTE5)
NG
OK
Registry of ignition key 2 - 3 completed.
Red immobilizer warning indicator light blinking. Pattern (4), (5)
Turn to "OFF" and remove ignition key 2 - 3.
Vacant Register Memory
Exist
None
Red immobilizer warning indicator light goes off.
End
···Key registry action
Blinking Patterns and Number
0.2second
(1) ON OFF
0.5second 0.5second
(2) ON OFF
(3) ON OFF
(4) ON OFF
(5) ON OFF
0.3second
(6) ON OFF

**NOTE**

1. ECU confirms the following.
   - ○ Power Supply of Amplifier
   - ○ Connection of Amplifier
   - ○ Time of Transmitting and Receiving Signals
2. ECU confirms the following.
   - ○ Immobilizer Amplifier Failure Pattern (1)
   - ○ Registered Ignition Key Collation Error Pattern (6)
3. ECU confirms the following.
   - ○ Registered Ignition Key Code.
   - ○ Matching Unique Code
4. Key Registration Waiting Time.
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
5. ECU confirms the following.
   - ○ Matching Unique Code
   - ○ Not Registered Ignition Key
   - ○ Ignition Key or not
6. Perform the same procedure for other registered ignition key(s).

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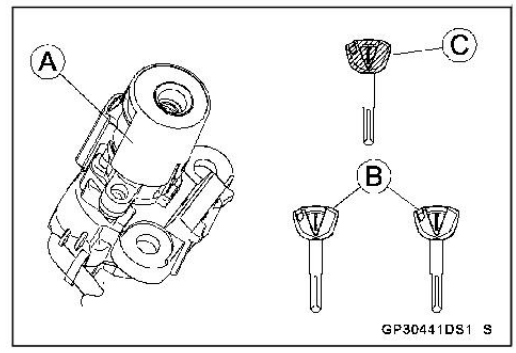
## Immobilizer System (Equipped Models)

**Case 2: When the ignition switch is faulty and to be replaced.**

- Prepare a new ignition switch [A] and two new ignition keys [B].

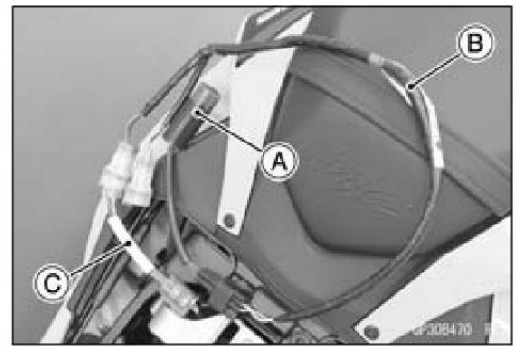
○These parts are available as a set. Prepare the current registered ignition key [C].

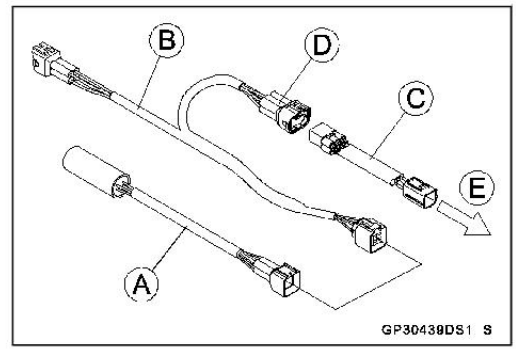



- Remove:
  Ignition Switch (see Immobilizer System Parts Replacement(16-95))
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].

- Connect the key registration unit [A], key registration adapter [B] and OBDII adapter cable [C] as shown.
  6 Pins Connector [D]
  To the main harness [E]

**Special Tools - Key Registration Unit: 57001-1582**
**Key Registration Adapter: 57001-1746**
**OBDII Adapter Cable: 57001-1880**



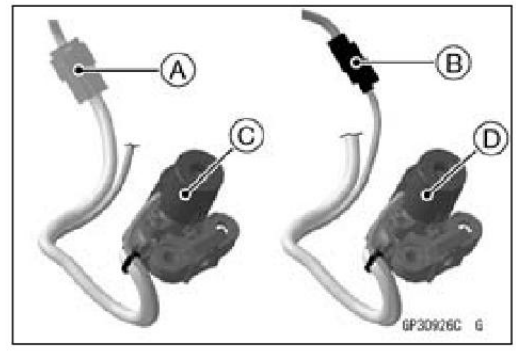




- Connect:
  New Ignition Switch Connector [A]
  Current Immobilizer Antenna Connector [B]

**NOTE**

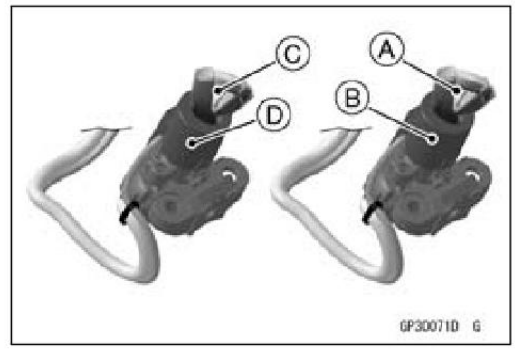
○*Keep the ignition switches more than 15 cm (5.9 in.).*

New Ignition Switch [C]
Current Ignition Switch [D]

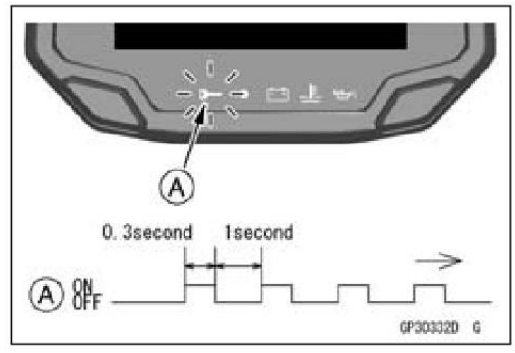


## Immobilizer System (Equipped Models)

- Insert the current registered ignition key [A] at the current ignition switch [B].
- Insert the new ignition key 1 [C] to the new ignition switch [D] and turn it to “ON.”



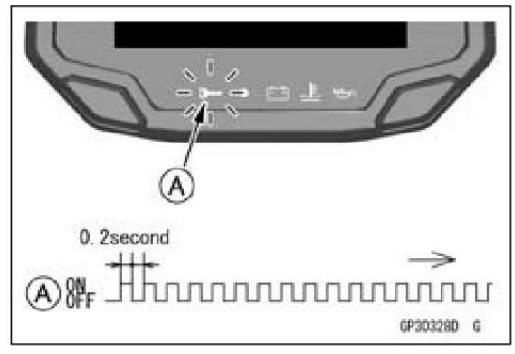

○The red immobilizer warning indicator light [A] blink 1 time and stops for 1 second and repeats this cycle.



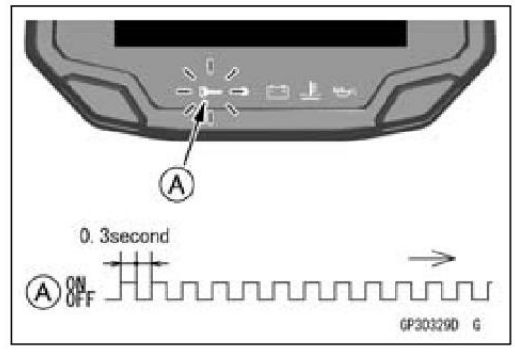

**Not Verified**

○The red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure




Registered Ignition Key Collation Error




- Turn to “OFF” and remove the new ignition key 1.

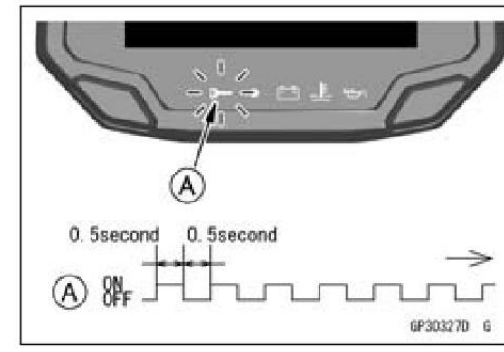
**NOTE**

○*Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.*

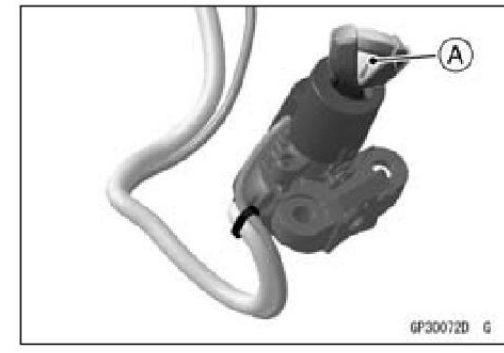
## Immobilizer System (Equipped Models)

**Verified**

○The red immobilizer warning indicator light [A] blinks to display the ECU is in the registration mode (go to the next step).




- Disconnect the immobilizer antenna connector, then connect the antenna connector of the new ignition switch.
- Insert the ignition key 1 [A] again into the new ignition switch and turn it to “ON.”




**NOTE**

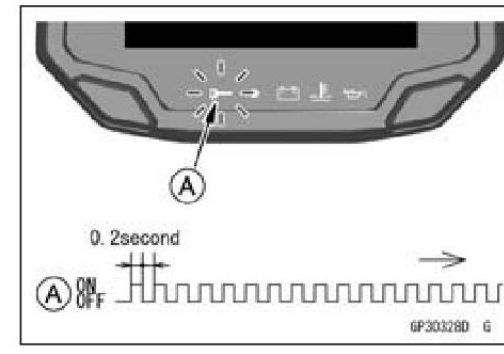
○*Insert the next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

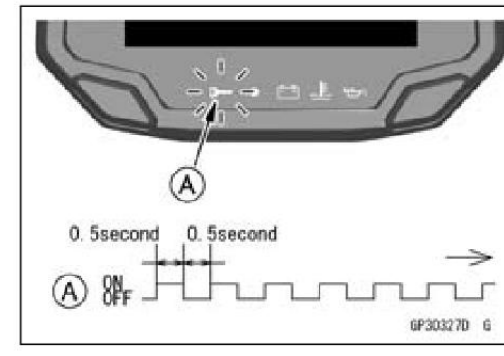
○*Keep other ignition keys away from the ignition switch.*

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

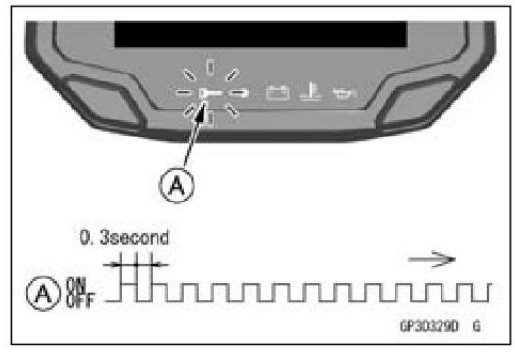



When Registered Ignition Key is Inserted.

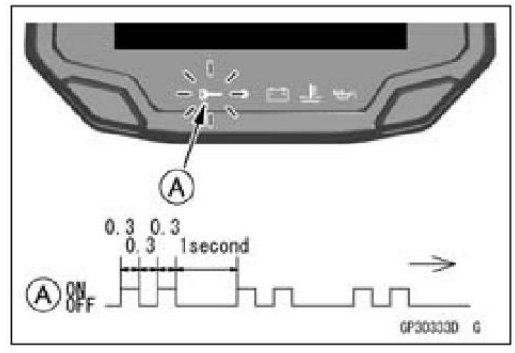


## Immobilizer System (Equipped Models)

Ignition Key Collation Error



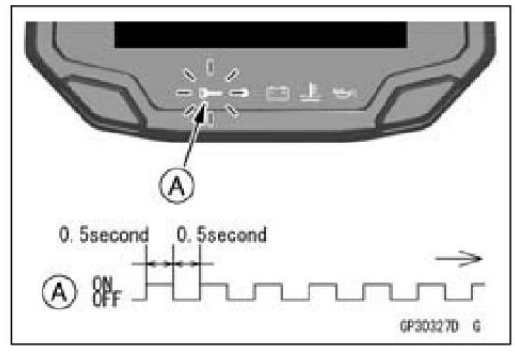

● The ignition key 1 is successfully registered in the ECU.
○The red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of ignition key 1.




● Turn to “OFF” and remove ignition key 1.
○The red immobilizer warning indicator light [A] blinks to display the registration mode.

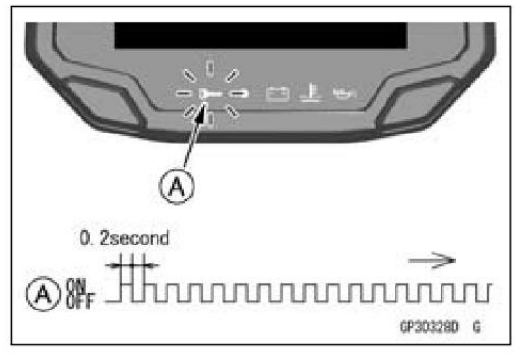
**NOTE**

- ○*Turn to “OFF” the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and red immobilizer warning indicator light goes off.*
- ○*This procedure has , registered the registered ignition key and one ignition key.*
- ○*Continue the procedure to program the second and later keys.*



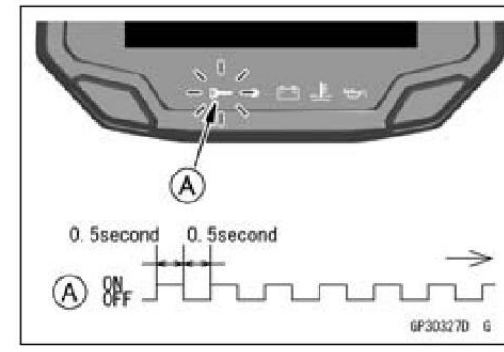

● Insert the ignition key 2 to the ignition switch and turn it to “ON.”

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.
Immobilizer Amplifier Failure

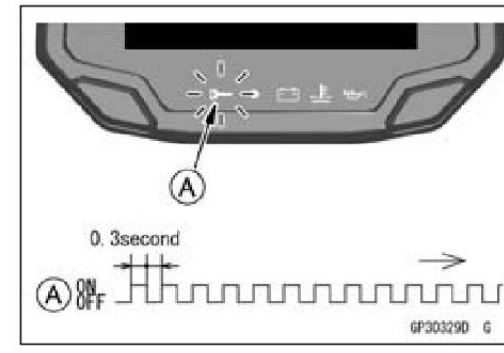


## Immobilizer System (Equipped Models)

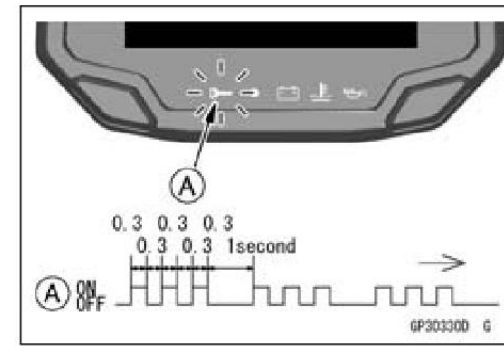
When Registered Ignition Key is Inserted.



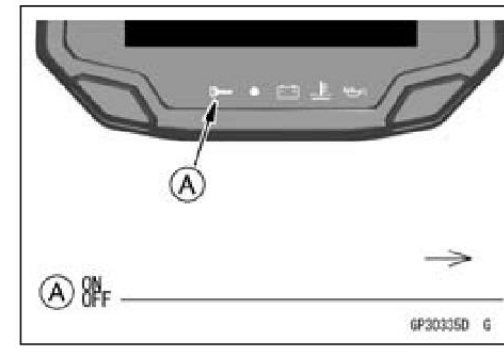

Ignition Key Collation Error




- The ignition key 2 is successfully registered in the ECU.
  ○The red immobilizer warning indicator light [A] blinks 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of ignition key 2.
- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.




- The red immobilizer warning indicator light [A] goes off.




- Remove the special tools and install the immobilizer/Kawasaki diagnostic system connector cap.

**NOTE**

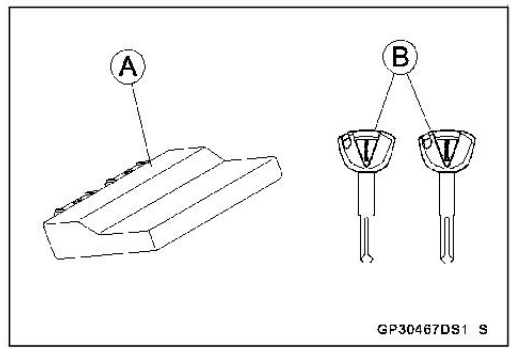
○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

- Install the new ignition switch (see Immobilizer System Parts Replacement(16-95)).

## Immobilizer System (Equipped Models)

**Case 3: When the ECU is faulty and has to be replaced.**

- Prepare a new ECU [A] and current registered ignition key(s) [B].




**NOTE**

○*The key registration unit is not required.*

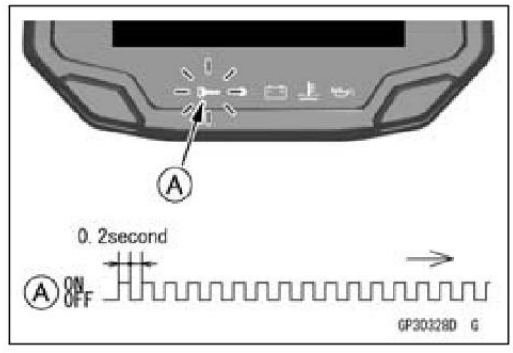
○*After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.*

- Replace the ECU (see ECU Removal(3-12)).

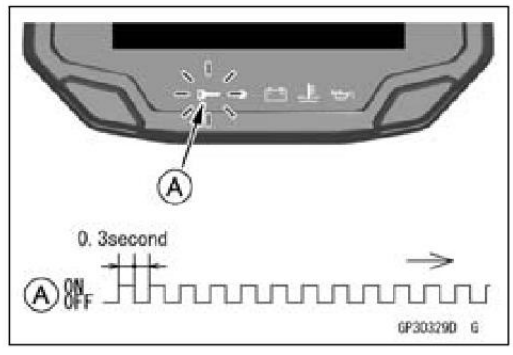
- Insert the current registered ignition key into the ignition switch and turn it to "ON."

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

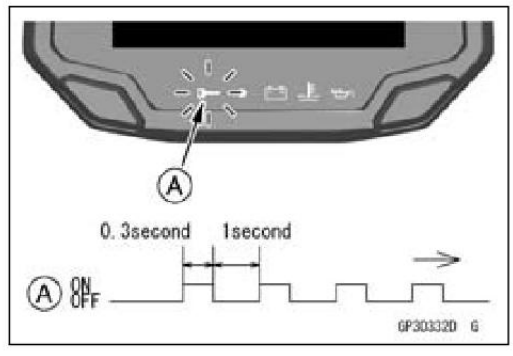



Registered Ignition Key Collation Error



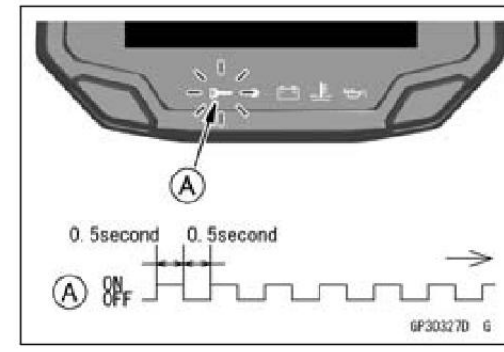

- The registered ignition key is registered in the ECU.

○The red immobilizer warning indicator light [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered ignition key.



## Immobilizer System (Equipped Models)

● Turn to “OFF” the registered ignition key and remove it.
○The red immobilizer warning indicator light [A] blinks to display the registration mode.




**NOTE**

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red immobilizer warning indicator light goes off.*
○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

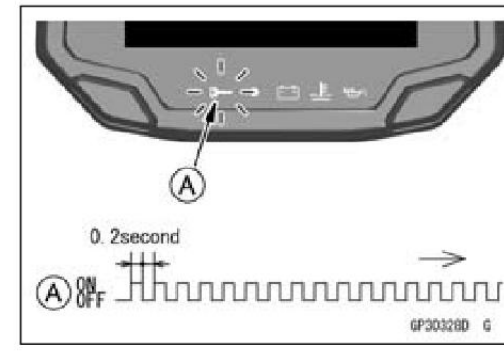
● Insert the other remaining registered ignition key to the ignition switch and turn it to “ON.”

**NOTE**

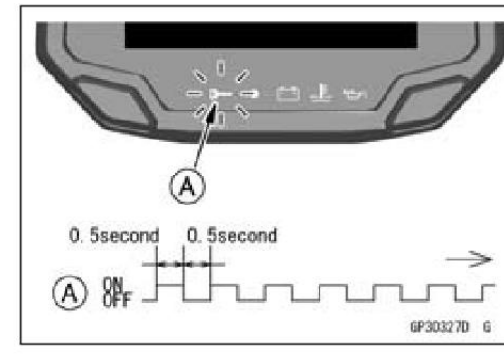
○*Keep the other ignition keys away from the immobilizer antenna.*

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

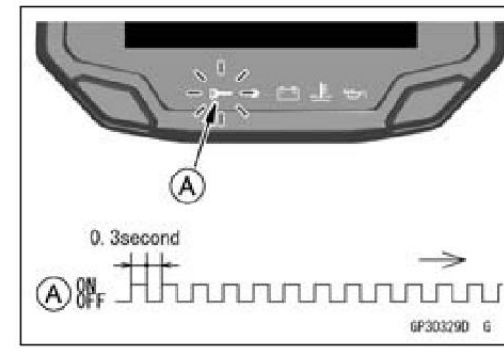
Immobilizer Amplifier Failure




When Registered Ignition Key is Inserted.

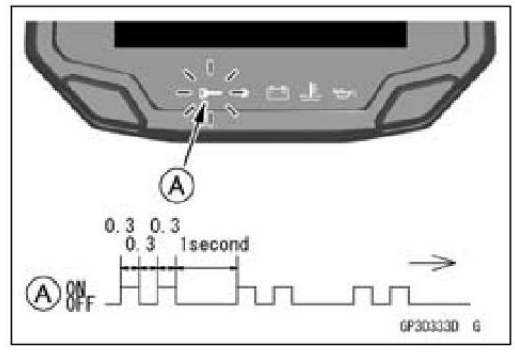



Ignition Key Collation Error



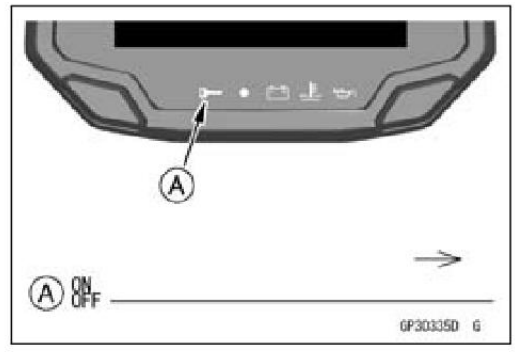
## Immobilizer System (Equipped Models)

● The other remaining ignition key is registered in the ECU.
○The red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of ignition key.




● Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
● The registration mode automatically ends.

● The red immobilizer warning indicator light [A] goes off.




**NOTE**

○*Turn the ignition switch to “ON” with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

**Case 4: When all registered ignition keys are faulty or lost.**

The all registered ignition keys replacement is considered very rare case. However if it is required, the following is necessary.

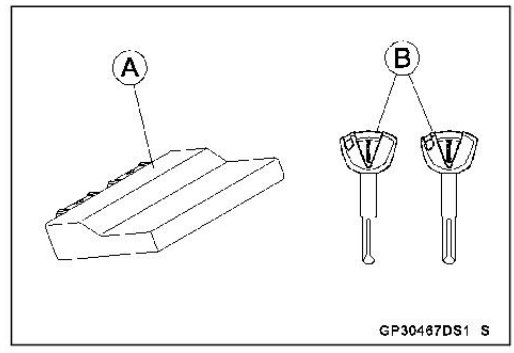
**NOTE**

○*The ECU must be replaced with a new one because the registered ignition key code that is registered in the current ECU can not be rewritten.*

● Prepare a new ECU [A] and 2 new ignition keys [B].

**NOTE**

○*The key registration unit is not required.*
○*The key registration process is same as the electric control unit replacement.*

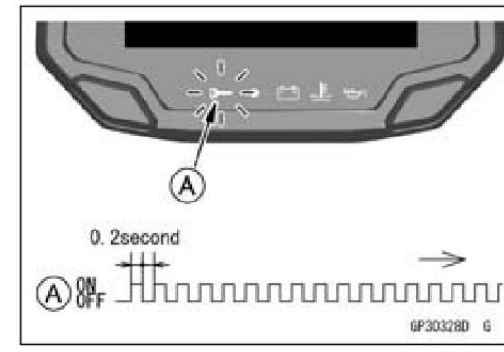



● Insert the first ignition key into the ignition switch and turn it to “ON.”

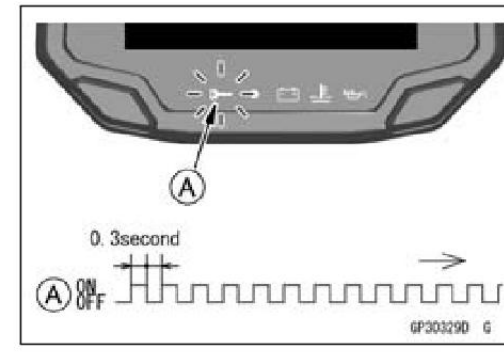
## Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

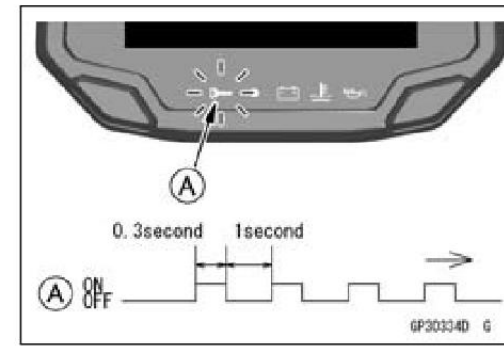



Ignition Key Collation Error




● The first ignition key is registered in the ECU.

○The red immobilizer warning indicator light [A] blink 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first ignition key.



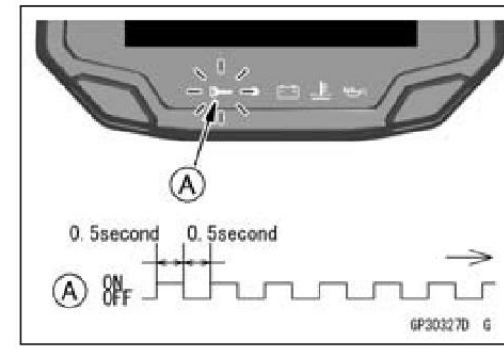

● Turn to “OFF” the first ignition key and remove it.

● The red immobilizer warning indicator light [A] blinks to display the registration mode.

**NOTE**

○*Insert next key and turn it to “ON” within 15 seconds after previous key is turned to “OFF” and removed otherwise registration mode will be ended and the red immobilizer warning indicator light goes off.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*




● Insert the second ignition key to the ignition switch and turn it to “ON.”

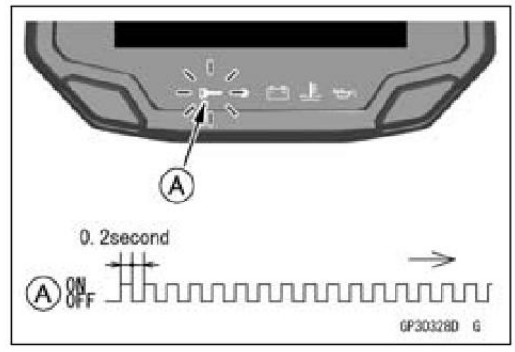
**NOTE**

○*Keep the other ignition keys away from the immobilizer antenna.*

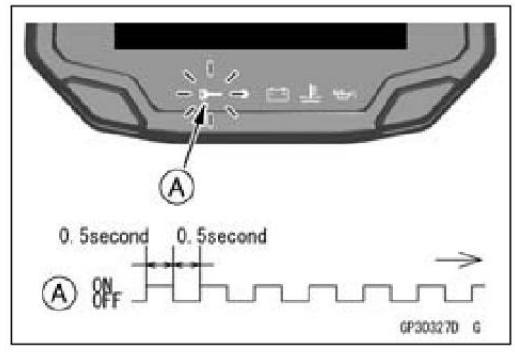
## Immobilizer System (Equipped Models)

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

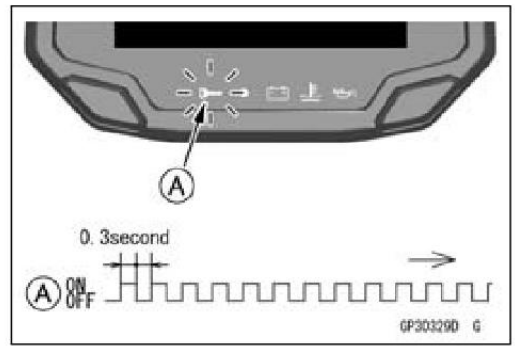
Immobilizer Amplifier Failure




When Registered Ignition Key is Inserted



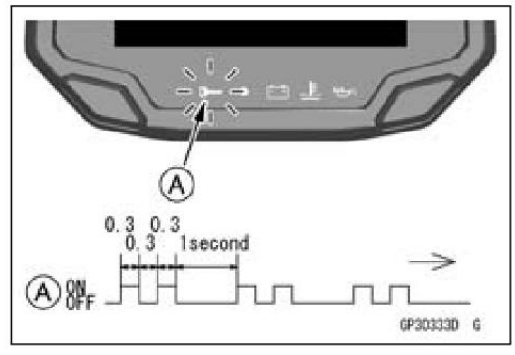

Ignition Key Collation Error



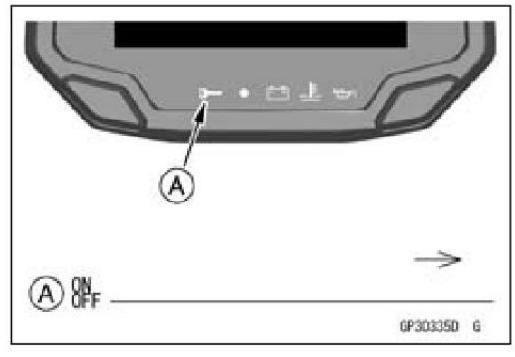

- The second ignition key is registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second ignition key.

- Turn to “OFF” the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.




- The red immobilizer warning indicator light [A] goes off.



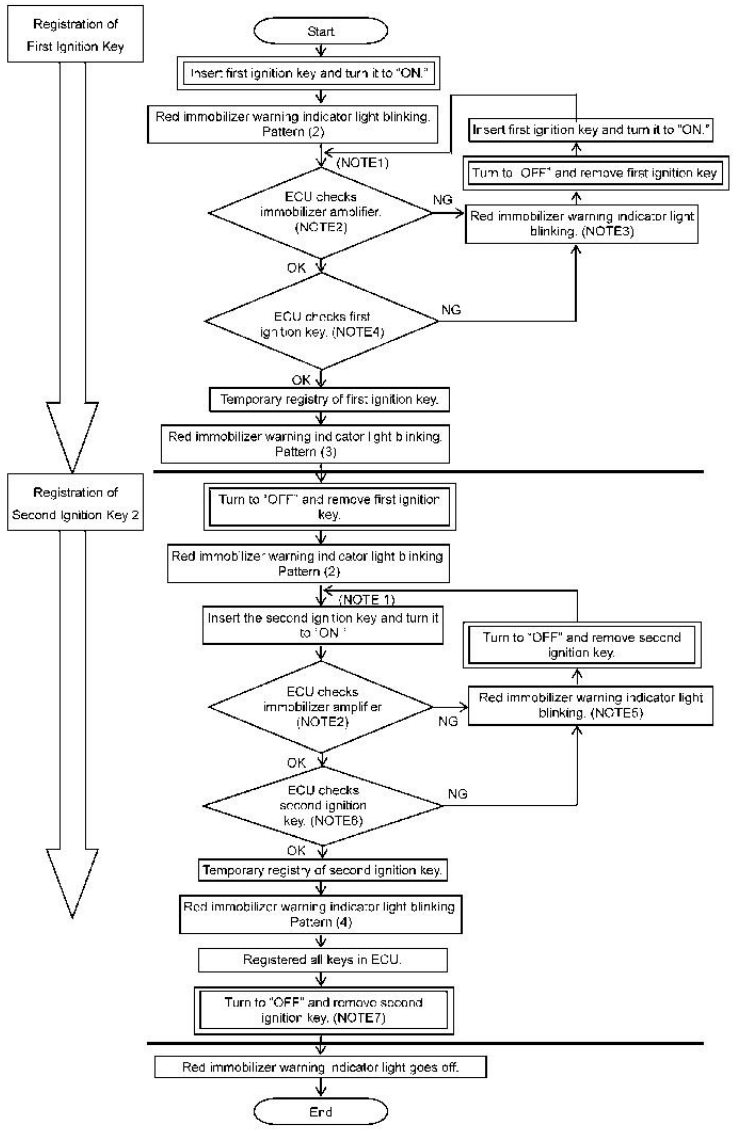
## Immobilizer System (Equipped Models)

**NOTE**

- *Turn the ignition switch to "ON" with the registered ignition key.*
- *Check that the engine can be started using all registered ignition keys.*

## Immobilizer System (Equipped Models)

### All Keys Initial Registration Flow Chart


Registration of First Ignition Key
Start
Insert first ignition key and turn it to "ON."
Red immobilizer warning indicator light blinking. Pattern (2)
(NOTE1)
ECU checks immobilizer amplifier. (NOTE2)
NG
Red immobilizer warning indicator light blinking. (NOTE3)
Turn to "OFF" and remove first ignition key
Insert first ignition key and turn it to "ON."
OK
ECU checks first ignition key. (NOTE4)
NG
OK
Temporary registry of first ignition key.
Red immobilizer warning indicator light blinking. Pattern (3)
Registration of Second Ignition Key 2
Turn to "OFF" and remove first ignition key.
Red immobilizer warning indicator light blinking Pattern (2)
(NOTE 1)
Insert the second ignition key and turn it to "ON."
Turn to "OFF" and remove second ignition key.
ECU checks immobilizer amplifier (NOTE2)
NG
Red immobilizer warning indicator light blinking. (NOTE5)
OK
ECU checks second ignition key. (NOTE6)
NG
OK
Temporary registry of second ignition key.
Red immobilizer warning indicator light blinking Pattern (4)
Registered all keys in ECU.
Turn to "OFF" and remove second ignition key. (NOTE7)
Red immobilizer warning indicator light goes off.
End
···Key registry action
Blinking Patterns and Number
0.2second
(1) ON OFF
0.5second 0.5second
(2) ON OFF
0.3second 1second
(3) ON OFF
0.3 0.3
0.3 1second
(4) ON OFF
0.3second
(5) ON OFF

**NOTE**

1. Key Substitute Time
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
2. ECU confirms the following.
   - Power Supply of Amplifier
   - Connection of Amplifier
   - Time of Transmitting and Receiving Messages.
3. ECU confirms the following.
   - Immobilizer Amplifier Failure Pattern (1)
   - Ignition Key Collation Error Pattern (5)
4. ECU confirms the following.
   - Ignition Key or Not
   - Match the Unique Code
5. ECU confirms the following.
   - Immobilizer Amplifier Failure Pattern (1)
   - Second Ignition Key Collation Error Pattern (5)
   - Registered Ignition Key is Inserted Pattern (2)
6. ECU confirms the following.
   - Ignition Key or Not.
   - Match the Unique Code
   - Not Registered Ignition Key
7. When the ECU-registered key is turned to "OFF", ECU keeps the power on for two seconds.
   And then, in two seconds after the key is turned to "OFF", ECU turns the power off.

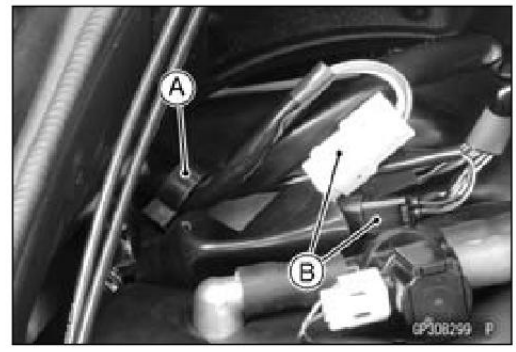
GP30325D F

## Immobilizer System (Equipped Models)

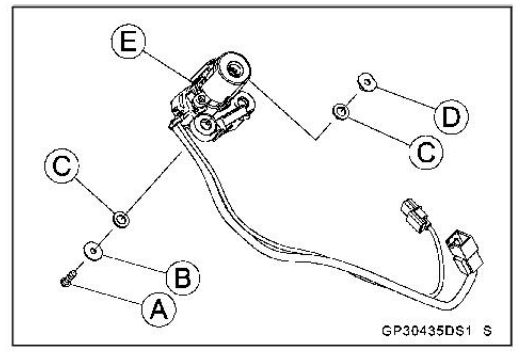
### *Immobilizer System Parts Replacement*

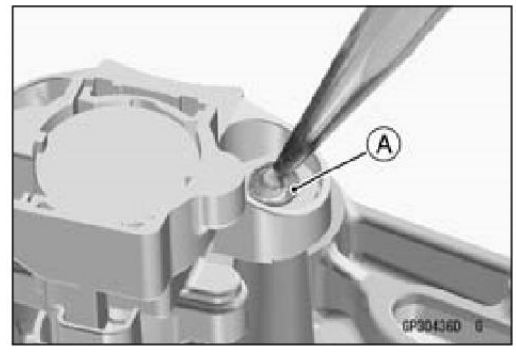
**Ignition Switch Replacement**

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Open the clamp [A].
- Disconnect the connectors [B].




- Remove:
  Steering Stem Head and Handlebars (see Handlebar Removal(14-10))
- Remove the ignition switch bolts [A] by turning them using a small chisel or punch.
- Remove:
  Washers [B]
  Dampers [C]
  Collars [D]
  Ignition Switch [E]
- Replace the ignition switch and the ignition switch bolts with new ones.

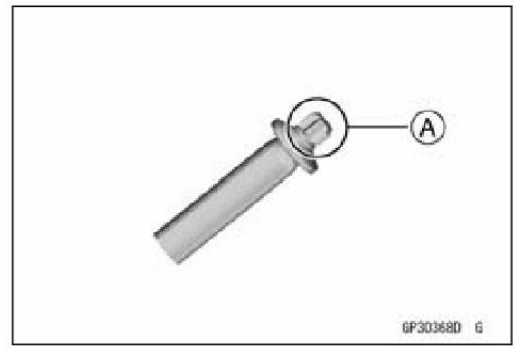



- Register the more than two ignition keys (see Key Registration(16-77)).
- Installation is the reverse of removal.

○When installing a new Torx bolt, tighten it until the bolt head [A] is broken.

○Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).

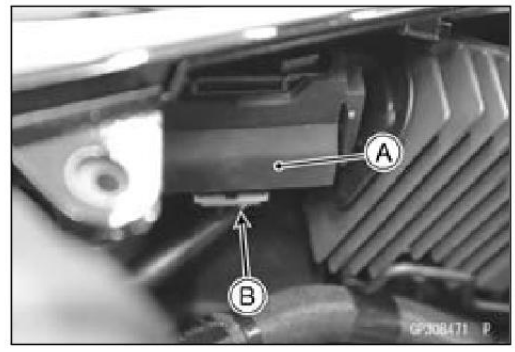



**Immobilizer Amplifier Replacement**

- Remove:
  Left Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))

## Immobilizer System (Equipped Models)

- Remove the immobilizer amplifier [A] with connector [B] connected.
- Pull out the immobilizer amplifier together with the rubber protector.
- Disconnect the connector.




### ECU Replacement

- Refer to the ECU Removal/Installation.

### Immobilizer Relational Parts Replacement Chart

| | | Failed or Lost Part | | | |
|---|---|---|---|---|---|
| | | Ignition Key | Ignition Switch | Amplifier | ECU |
| * | Ignition Key | ● | ○ | | |
| | Ignition Switch | | ● | | |
| | Amplifier | | | ● | |
| | ECU | ○ | | | ● |

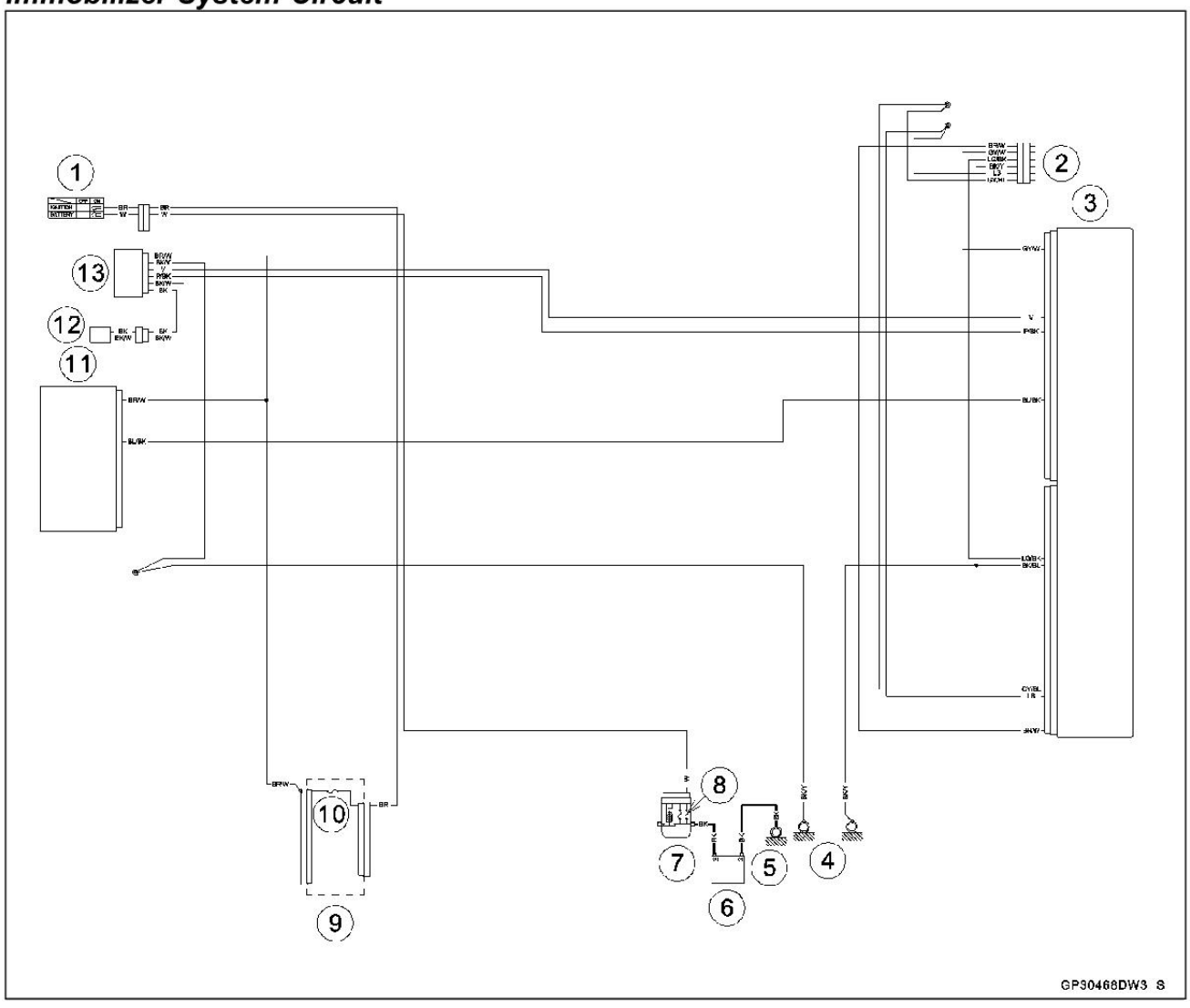
| | |
|---|---|
| * | Replacement Part |
| ● | Main Replacement Part |
| ○ | Additional Replacement Part |

### *Immobilizer System Inspection*

- Refer to the Immobilizer Amplifier and Blank Key Detection section (see DTC P1507(17-100)) (see DTC P1508(17-101)).

## Immobilizer System (Equipped Models)

### *Immobilizer System Circuit*




1. Ignition Switch
2. Immobilizer/Kawasaki Diagnostic System Connector
3. ECU
4. Frame Grounds
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. Fuse Box (1)
10. Ignition Fuse 15 A
11. Meter Unit
12. Immobilizer Antenna
13. Immobilizer Amplifier

## Switches and Sensors

### *Brake Light Timing Inspection*

● Refer to the Brake Light Switch Operation Inspection (see Brake Light Switch Operation Inspection(2-55)).

### *Brake Light Timing Adjustment*

● Refer to the Brake Light Switch Operation Inspection (see Brake Light Switch Operation Inspection(2-55)).

### *Switch Inspection*

● Using a digital meter, check to see that only the connections shown in the table have continuity.

○For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

**Rear Brake Light Switch Connections**

| Rear Brake Light Switch Connections | | |
|---|---|---|
| Color | BR | BL |
| When brake pedal is pushed down | ○ | ○ |
| When brake pedal is released | | |

**Side Stand Switch Connections**

| Side Stand Switch Connections | | |
|---|---|---|
| Color | BK | G |
| When side stand is down | | |
| When side stand is up | ○ | ○ |

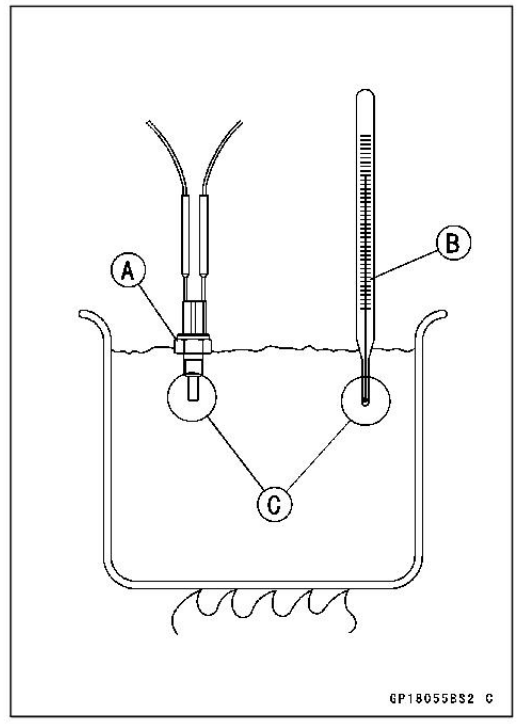
**Oil Pressure Switch Connections***

| Oil Pressure Switch Connections * | | |
|---|---|---|
| Color | SW. Terminal | Ground |
| When engine is stopped | ○ | ○ |
| When engine is running | | |

*: Engine lubrication system is in good condition.

## Switches and Sensors

### *Water Temperature Sensor Inspection*




- Remove the water temperature sensor (see Water Temperature Sensor Removal(17-69)).
- Suspend the sensor [A] in a container of coolant so that the threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.

**NOTE**

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

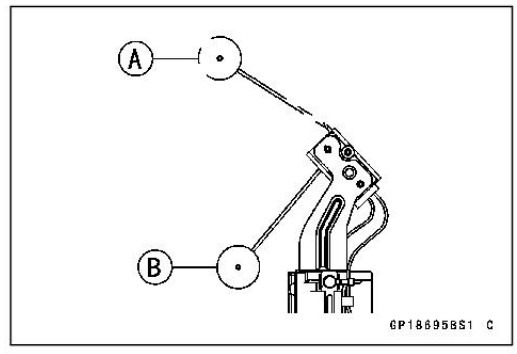
★If the digital meter does not show the specified values, replace the sensor.

**Water Temperature Sensor Resistance**

**Standard: 40°C (104°F): 1.041 – 1.231 kΩ**

**100°C (212°F): 0.1483 – 0.1623 kΩ**

### *Fuel Level Sensor Inspection*



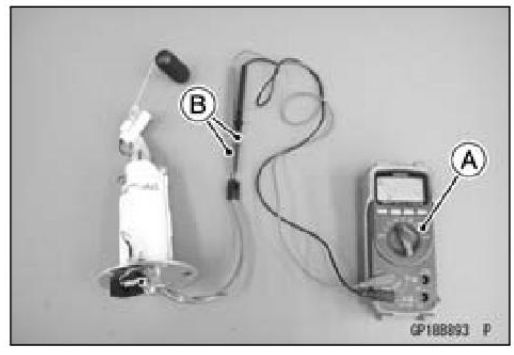

- Remove:

  Fuel Pump (see Fuel Pump Removal(3-22))
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the fuel pump.

Float in Full Position [A]

Float in Empty Position [B]




- Using a digital meter [A], measure the resistance across the terminals in the fuel level sensor connector [B].

**Special Tool - Needle Adapter Set: 57001-1874**

★If the digital meter readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

**Fuel Level Sensor Resistance**

**Connections: R/BK lead ←→ BK/W lead**

**Standard: Full position: 9.6 – 12.4 Ω**

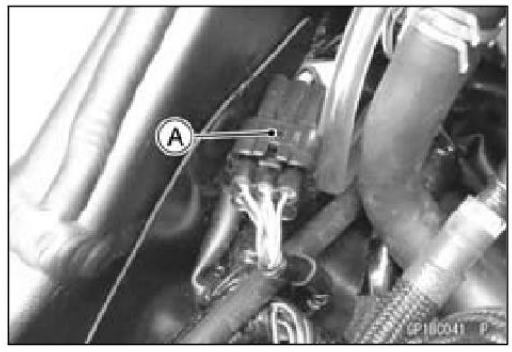
**Empty position: 222 – 228 Ω**

## Switches and Sensors

### *Gear Position Switch Inspection*

**NOTE**

○*Be sure the transmission and external shift mechanism are good condition.*

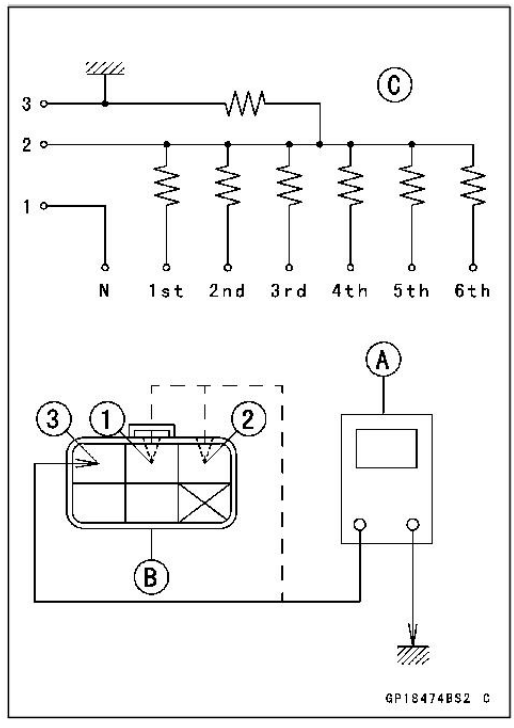



- Remove the fuel tank (see Fuel Tank Removal(3-38)).
- Disconnect the connector [A].

- Connect a digital meter [A] to the terminals in the connector [B] and ground.

○When changing the gear position from lower gear to higher gear, raise the rear wheel off the ground with the stand and rotate the rear wheel by hand.

Internal Circuit [C]
[1] LG Lead
[2] G/R Lead
[3] BK Lead



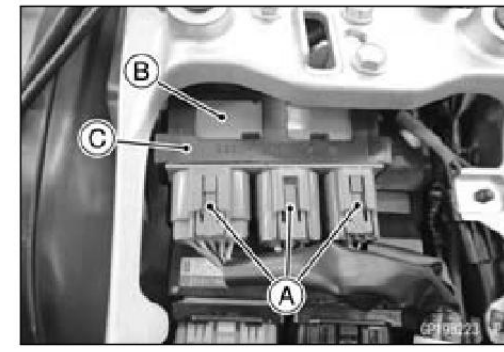

**Gear Position Switch Resistance** **(Unit: kΩ)**

| | Connections | | |
|---|---|---|---|
| Gear Position | [1]-Ground | [2]-Ground | [3]-Ground |
| Neutral | about 0 | 8.64 – 9.54 | about 0 |
| 1st | – | 2.22 – 2.46 | about 0 |
| 2nd | – | 1.42 – 1.58 | about 0 |
| 3rd | – | 0.955 – 1.055 | about 0 |
| 4th | – | 0.644 – 0.711 | about 0 |
| 5th | – | 0.410 – 0.453 | about 0 |
| 6th | – | 0.241 – 0.266 | about 0 |

★If the digital meter reading is not as specified, replace the gear position switch with a new one.

## Relay Box

### *Relay Box Removal*




- Remove the center seat cover (see Center Seat Cover Removal(15-22)).
- Disconnect the connectors [A].
- Pull out the relay box [B] from the rubber protector [C].

**NOTE**

○*The relay box has relays and diodes. The relays and diodes can not be removed.*

### *Relay Circuit Inspection*

- Remove the relay box (see Relay Box Removal(16-101)).
- Check conductivity of the following numbered terminals by connecting a digital meter and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit(16-103)).

★If the digital meter does not read as specified, replace the relay box.

**Relay Circuit Inspection (with the battery disconnected)**

| | Digital Meter Connection | Digital Meter Reading (Ω) |
|---|---|---|
| Headlight Circuit Relay | 1-3 | ∞ |
| ECU Main Relay | 7-6 | ∞ |
| | 4-5 | Not ∞* |
| Fuel Pump Relay | 7-8 | ∞ |
| | 9-10 | Not ∞* |
| Starter Circuit Relay | 16-14 | ∞ |
| Radiator Fan Relay | 17-20 | ∞ |
| | 18-19 | Not ∞* |

*: The actual reading varies with the digital meter used.

## Relay Box

**Relay Circuit Inspection (with the battery connected)**

| | Battery Connection (+) (–) | Digital Meter Connection | Digital Meter Reading (Ω) |
|---|---|---|---|
| Headlight Circuit Relay | 1-11 | 1-3 | 0 |
| ECU Main Relay | 4-5 | 7-6 | 0 |
| Fuel Pump Relay | 9-10 | 7-8 | 0 |
| Radiator Fan Relay | 18-19 | 17-20 | 0 |

| | Battery Connection (+) (–) | Digital Meter Connection DC 25 V Range (+) (–) | Digital Meter Reading (V) |
|---|---|---|---|
| Starter Circuit Relay | 16-12 | 14-12 | Nearly Battery Voltage* |

(+): Apply positive lead.
(–): Apply negative lead.
*: The voltage goes down slightly by the diode.

### *Diode Circuit Inspection*

- Remove the relay box (see Relay Box Removal(16-101)).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit(16-103)).

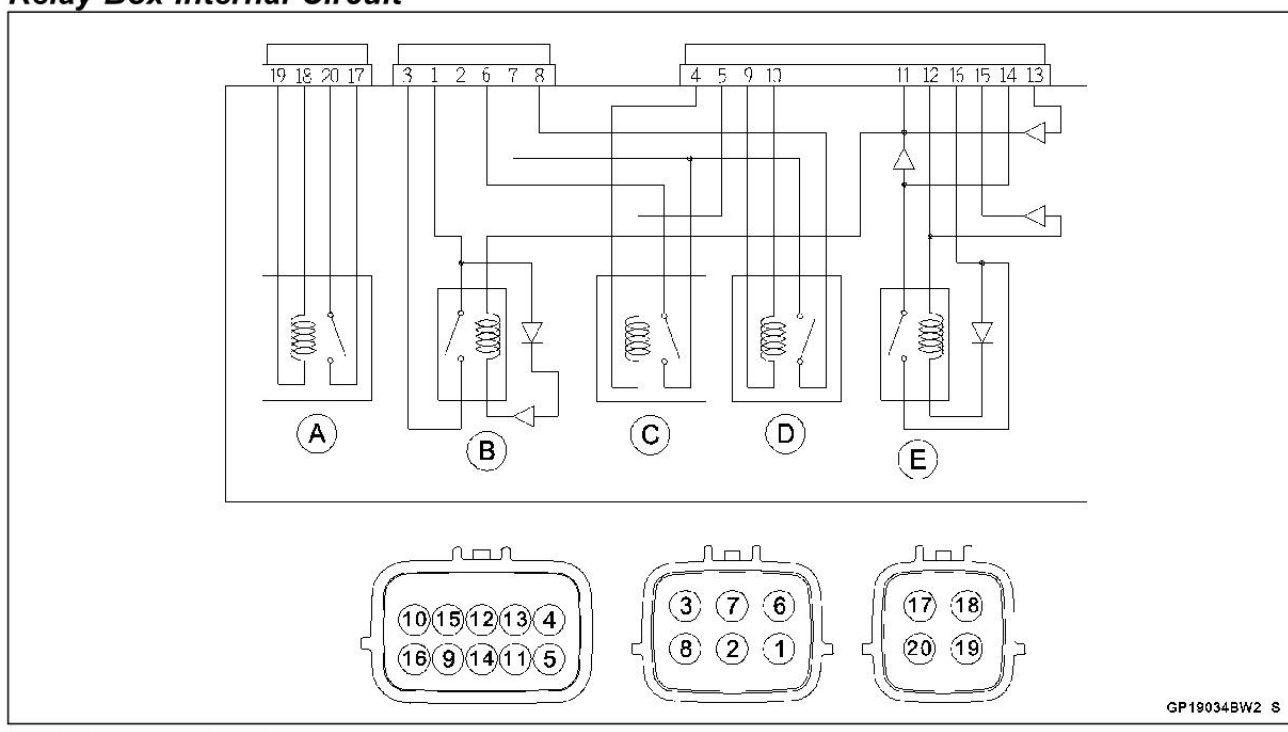
**Diode Circuit Inspection**

| | |
|---|---|
| Digital Meter Connection | 1-11, 12-15, 13-11, 14-11, 16-12 |

★The resistance should be low in one direction and more than 10 times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

## Relay Box

### *Relay Box Internal Circuit*




A: Radiator Fan Relay
B: Headlight Circuit Relay
C: ECU Main Relay
D: Fuel Pump Relay
E: Starter Circuit Relay

## Electrical Accessory Connector

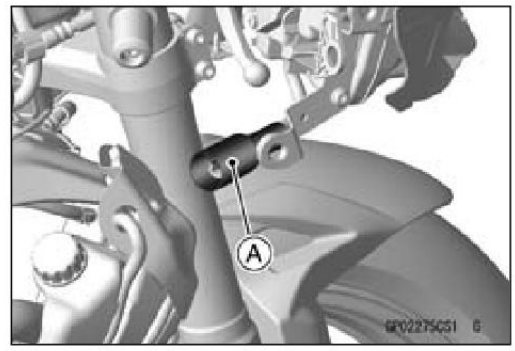
### *Electrical Accessory Connector Outline*

The electric power of the battery can be used through the electrical accessory connectors.

**NOTE**

○*Some models require a relay to use the electrical accessory connectors.*

For Accessory Socket (Back of Headlight) [A]




| Accessory Connectors | | Fuse Rating | Maximum Load |
|---|---|---|---|
| [A] | For Accessory Socket | 2 A | 23 W |

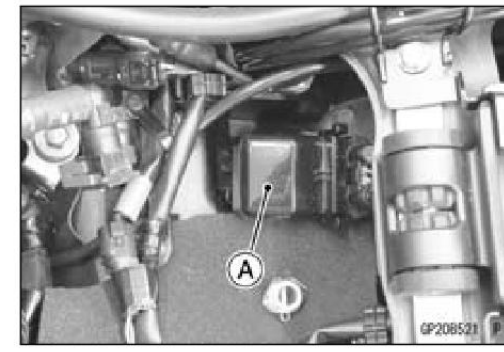
***NOTICE***

**Do not install a fuse of a higher rating than that specified. Do not connect a load that exceeds the maximum load to this accessory circuit or the battery may become discharged, even with the engine running.**

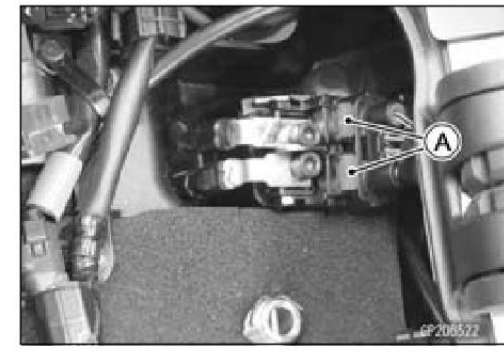
## Fuse

### *30 A Main/15 A ECU Fuse Removal*

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Starter Relay Cover [A]

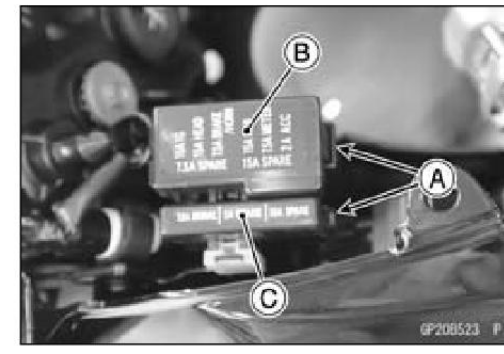



- Pull out the fuses [A] from the starter relay with needle nose pliers.

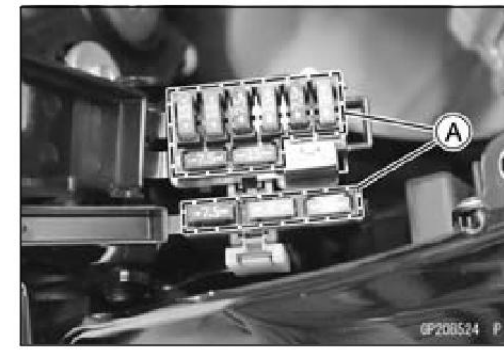



### *Fuse Box Fuse Removal*

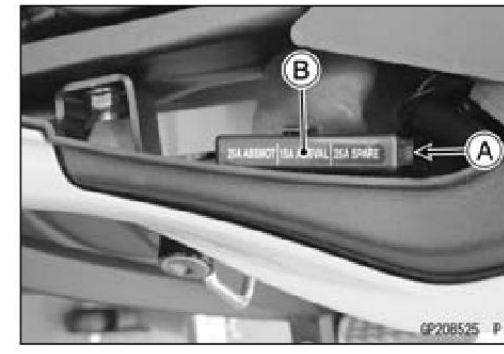
- Remove the left upper inner fairing (see Upper Inner Fairing Removal(15-17)).
- Unlock the hook [A] to lift up the lid.
  Fuse Box (1) [B]
  Fuse Box (2) [C]




- Pull the fuses [A] straight out of the fuse box with needle nose pliers.

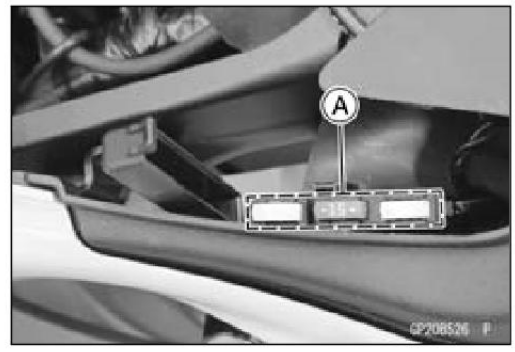



- Remove the front seat (see Front Seat Removal(15-8)).
- Unlock the hook [A] to lift up the lid.
  Fuse Box (3) [B]



## Fuse

- Pull the fuses [A] straight out of the fuse box with needle nose pliers.




### *Fuse Installation*

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

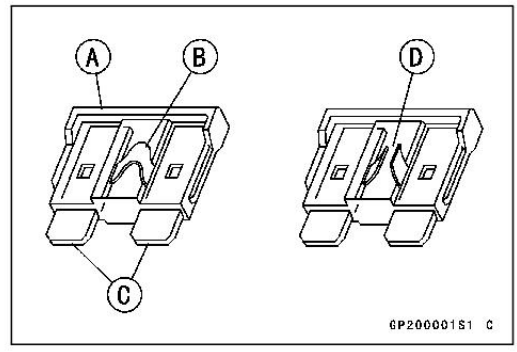
- Install the fuse box fuses on the original position as specified on the lid.

### *Fuse Inspection*

- Remove the fuse (see 30 A Main/15 A ECU Fuse Removal(16-105)) (see Fuse Box Fuse Removal(16-105)).
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]




| *NOTICE* |
| --- |
| **When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.** |

# Self-Diagnosis System

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## Specifications

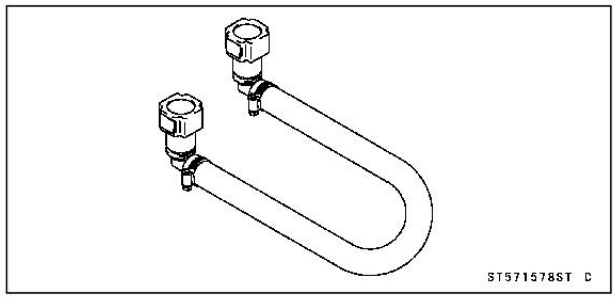
| Item | Standard |
|---|---|
| **Digital Fuel Injection System** | |
| Main Throttle Sensor: | |
| Input Voltage | DC 4.75 – 5.25 V |
| Output Voltage | DC 1.02 – 1.05 V at idle throttle opening |
| | DC 4.26 – 4.37 V at full throttle opening (for reference) |
| Resistance | 4 – 6 kΩ |
| Intake Air Pressure Sensor #1/#2: | |
| Input Voltage | DC 4.75 – 5.25 V |
| Output Voltage | DC 3.80 – 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg) |
| Intake Air Temperature Sensor: | |
| Output Voltage | About DC 2.25 – 2.50 V @20°C (68°F) |
| Resistance | 5.4 – 6.6 kΩ @0°C (32°F) |
| | 0.29 – 0.39 kΩ @80°C (176°F) |
| Water Temperature Sensor: | |
| Output Voltage | About DC 2.80 – 2.97 V @20°C (68°F) |
| Vehicle-down Sensor: | |
| Input Voltage | DC 4.75 – 5.25 V |
| Output Voltage | With sensor tilted 60 – 70° or more right or left: DC 0.65 – 1.35 V |
| | With sensor arrow mark pointed up: DC 3.55 – 4.45 V |
| Subthrottle Sensor: | |
| Input Voltage | DC 4.75 - 5.25 V |
| Output Voltage | DC 1.08 – 1.12 V at subthrottle valve full close position |
| | DC 4.44 – 4.56 V at subthrottle valve full open position (for reference) |
| Resistance | 4 – 6 kΩ |
| Front/Rear Oxygen Sensor: | |
| Output Voltage (Rich) | DC 0.8 V or more |
| Output Voltage (Lean) | DC 0.24 V or less |
| Heater Resistance | 13.0 – 18.5 Ω @20°C (68°F) |
| Exhaust Butterfly Valve Actuator Sensor: | |
| Input Voltage | DC 4.75 – 5.25 V |
| Output Voltage | DC 3.46 – 3.76 V |
| Resistance | 4 – 6 kΩ |
| Immobilizer Antenna (Equipped Models): | |
| Resistance | About 3.0 – 4.6 Ω |
| Purge Valve (Equipped Models): | |
| Resistance | 30 – 34 Ω @20°C (68°F) |
| Quick Shifter Sensor: | |
| Input Voltage | DC 4.75 – 5.25 V |
| Output Voltage | DC 2.45 – 4.65 V |

## Specifications

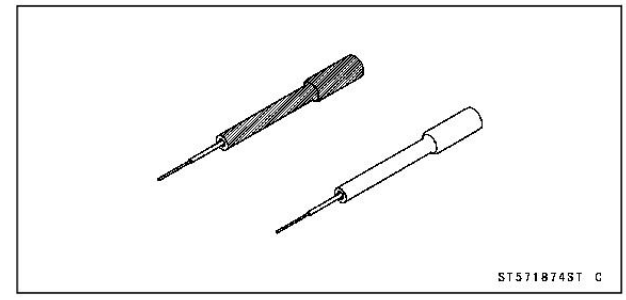
| Item | Standard |
|---|---|
| Fuel Injectors: | |
| Nozzle Type | Fine atomizing type with 8 holes |
| Resistance | About 11.7 – 12.3 Ω @20°C (68°F) |
| Subthrottle Valve Actuator: | |
| Input Voltage | About DC 8.5 – 10.5 V and then 0 V or About DC 8.5 – 10.5 V |
| Resistance | About 5.2 – 7.8 Ω |
| Exhaust Butterfly Valve Actuator: | |
| Resistance | 5 – 200 Ω (Reference) |
| **ABS (Equipped Models)** | |
| Wheel Rotation Sensor Air Gap: | |
| Front | 0.60 – 1.33 mm (0.02 – 0.05 in.) |
| Rear | 0.65 – 1.28 mm (0.03 – 0.05 in.) |
| CAN Communication Line Resistance | 30 – 70 Ω |
| CAN Communication Line/Ground Resistance | 4 – 30 kΩ |

## Special Tools and Sealant

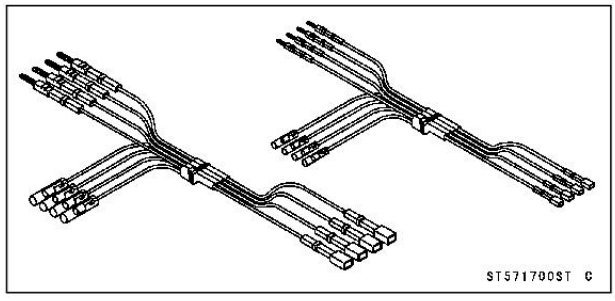
**Extension Tube:**
**57001-1578**



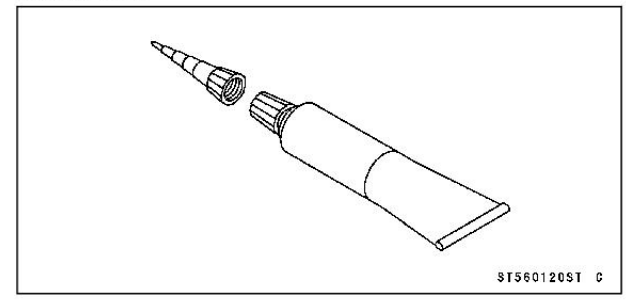

**Needle Adapter Set:**
**57001-1874**




**Measuring Adapter:**
**57001-1700**




**Liquid Gasket, TB1211:**
**56019-120**



## Special Tools and Sealant

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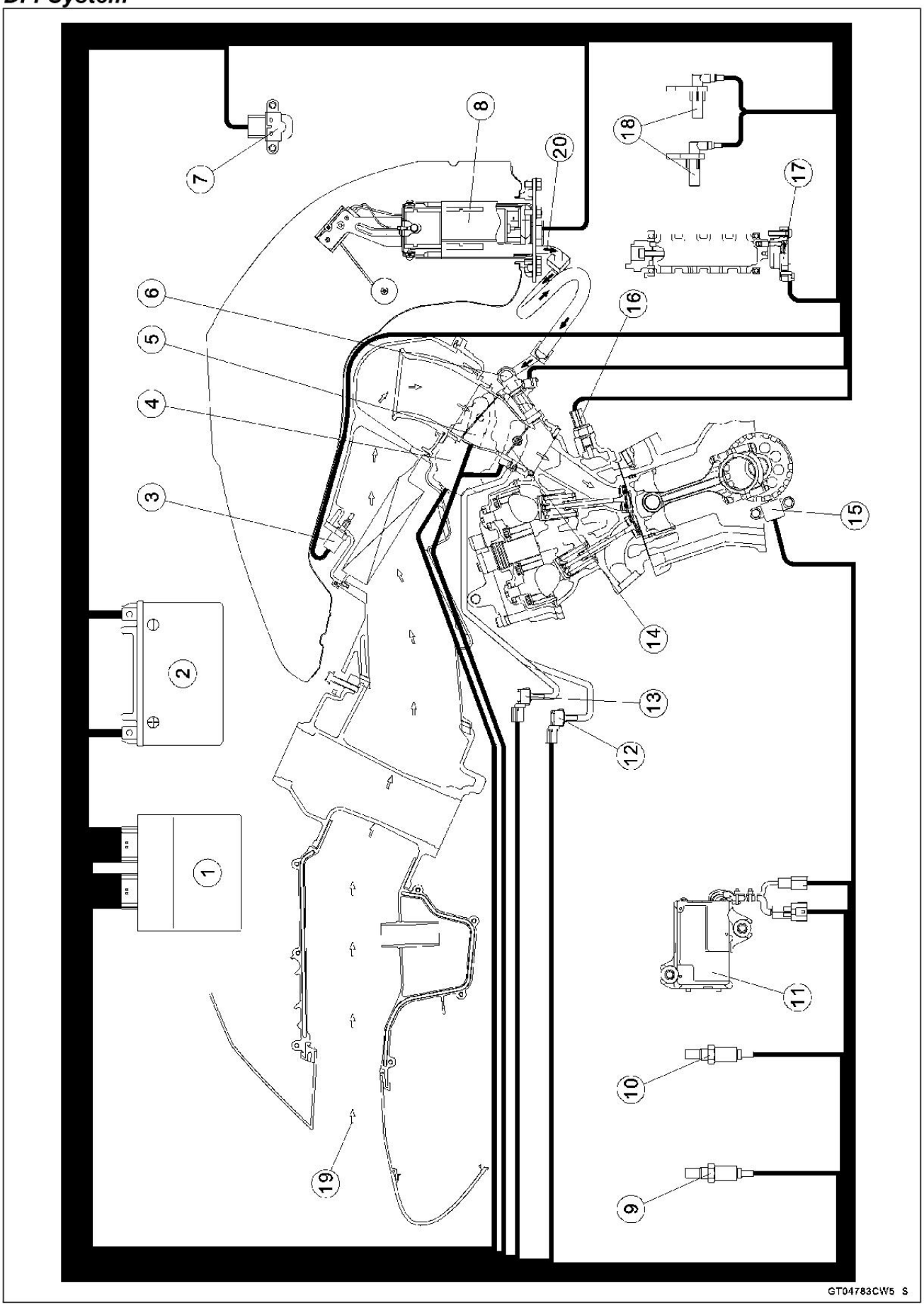
## Self-diagnosis System

### *DFI System*



## Self-diagnosis System

1. ECU
2. Battery
3. Intake Air Temperature Sensor
4. Subthrottle Valve Actuator
5. Subthrottle Sensor
6. Fuel Injectors
7. Vehicle-down Sensor
8. Fuel Pump
9. Front Oxygen Sensor
10. Rear Oxygen Sensor (Equipped Models)
11. Exhaust Butterfly Valve Actuator
12. Intake Air Pressure Sensor #1
13. Intake Air Pressure Sensor #2
14. Main Throttle Sensor
15. Crankshaft Sensor
16. Water Temperature Sensor
17. Gear Position Switch
18. Wheel Rotation Sensors
19. Air Flow
20. Fuel Flow

## Self-diagnosis System

### *DFI Components Naming*

The terms used in the European regulation for DFI components are sometimes different from those used by Kawasaki. Use this table to cross reference terms which may appear in a generic scan tool when diagnosing the DFI system.

| Sensors described in R44/2014 (Description per ISO 15031-6 in the parentheses) | Kawasaki Name |
|---|---|
| Barometric pressure sensor (Barometric pressure circuit) | Intake air pressure sensor #2 |
| Crankshaft position sensor (Crankshaft position sensor “A”) | Crankshaft sensor |
| Engine coolant temperature sensor (Engine coolant temperature sensor 1) | Water temperature sensor |
| Exhaust control valve angle sensor (Exhaust pressure control valve position sensor) | Exhaust butterfly valve actuator sensor |
| Gear shift position sensor (Gear Shift Position Circuit) | Gear position switch |
| Intake air temperature sensor (Intake air temperature sensor 1) | Intake air temperature sensor |
| Manifold absolute pressure sensor (Manifold absolute pressure/barometric pressure circuit) | Intake air pressure sensor #1 |
| $O_2$ sensor (binary/linear) signals ($O_2$ Sensor Bank 1 Sensor 1) | Front oxygen sensor |
| $O_2$ sensor (binary/linear) signals ($O_2$ Sensor Bank 1 Sensor 2) | Rear oxygen sensor |
| Throttle position sensor (Throttle/Pedal position sensor/switch “A”) | Main throttle sensor |
| Throttle position sensor (Throttle/Pedal position sensor/switch “B”) | Subthrottle sensor |
| Wheel speed sensor (Vehicle speed sensor “A”) | Front wheel rotation sensor |
| Wheel speed sensor (Vehicle speed sensor “B”) | Rear wheel rotation sensor |

| Actuators described in R44/2014 (Description per ISO 15031-6 in the parentheses) | Kawasaki Name |
|---|---|
| Evaporative emission system purge control valve (Evaporative emission system purge control valve) | Purge valve |
| Exhaust control valve actuator (motor driven) (Exhaust pressure control valve) | Exhaust butterfly valve actuator |
| Fuel injector (Injector - cylinder 1 – 4) | Fuel injector |
| Ignition coil primary control circuits (Ignition coil “A – D” primary/secondary circuit) | Stick coil |
| $O_2$ sensor heater ($HO_2S$ heater Bank 1 Sensor 1 control circuit) | Front oxygen sensor heater |
| $O_2$ sensor heater ($HO_2S$ heater Bank 1 Sensor 2 control circuit) | Rear oxygen sensor heater |
| Secondary air injection system (Secondary air injection system) | Air switching valve |
| Throttle by wire actuator (Throttle actuator control motor circuit) | Subthrottle valve actuator |

## Self-diagnosis System

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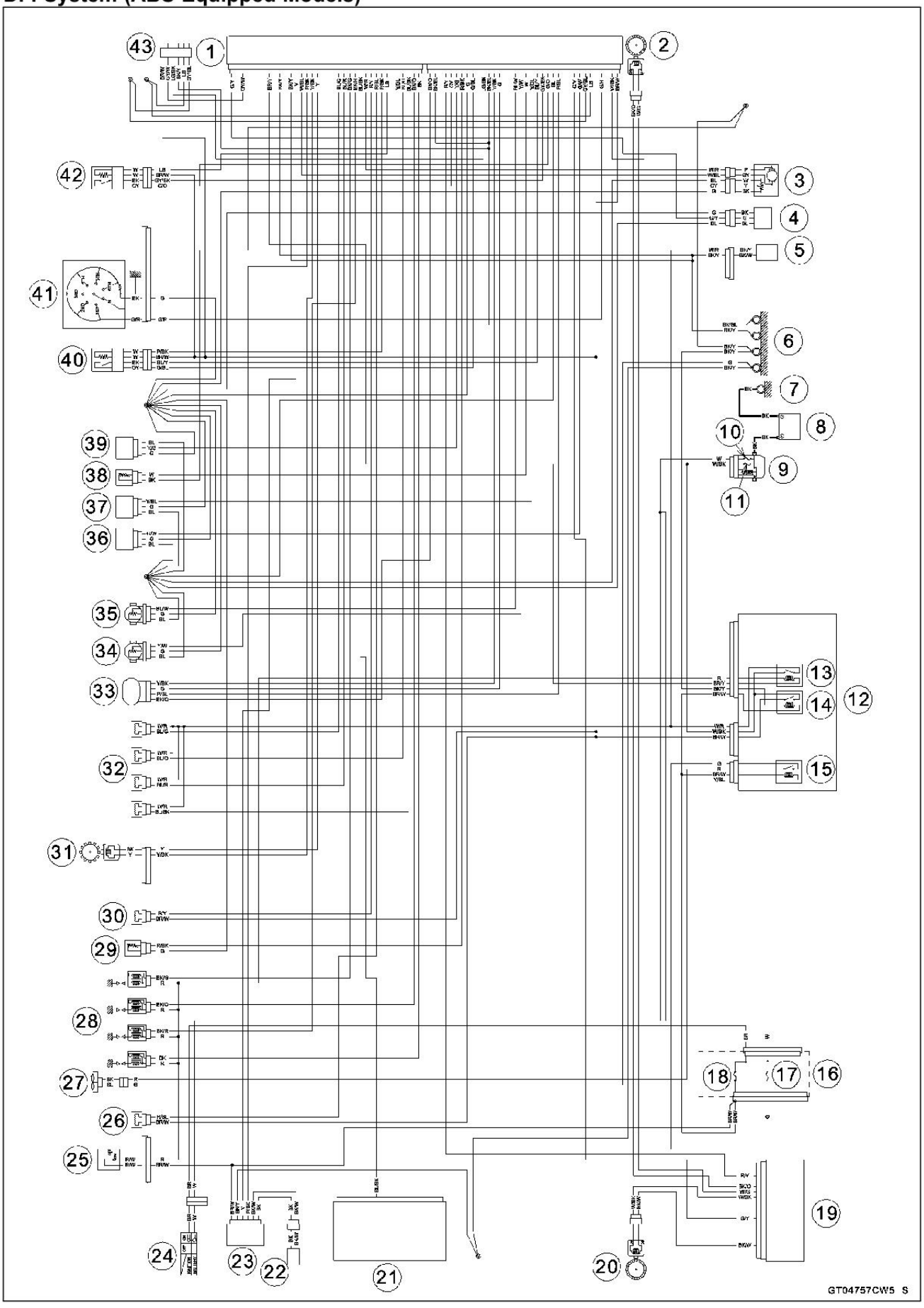
## Self-diagnosis System

### *Self-Diagnosis System Wiring Diagram*

**DFI System (ABS Equipped Models)**

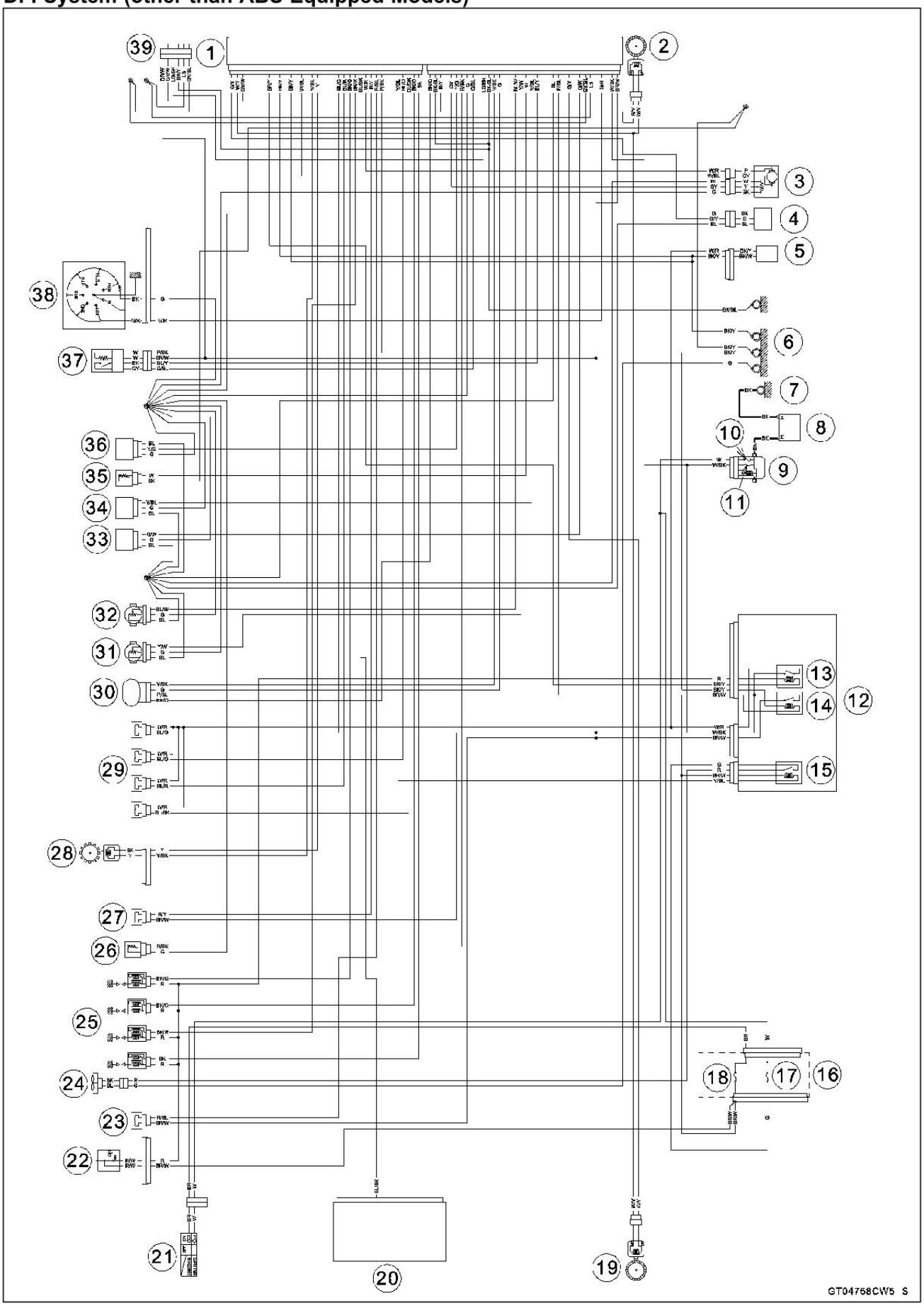


## Self-diagnosis System

1. ECU
2. Rear Wheel Rotation Sensor
3. Exhaust Butterfly Valve Actuator
4. Quick Shifter Sensor
5. Fuel Pump
6. Frame Grounds
7. Engine Ground
8. Battery
9. Starter Relay
10. Main Fuse 30 A
11. ECU Fuse 15 A
12. Relay Box
13. Fuel Pump Relay
14. ECU Main Relay
15. Radiator Fan Relay
16. Fuse Box (1)
17. Radiator Fan Fuse 15 A
18. Ignition Fuse 15 A
19. ABS Hydraulic Unit
20. Front Wheel Rotation Sensor
21. Meter Unit
22. Immobilizer Antenna (Equipped Models)
23. Immobilizer Amplifier (Equipped Models)
24. Ignition Switch
25. Engine Stop Switch
26. Air Switching Valve
27. Radiator Fan Motor
28. Stick Coils
29. Intake Air Temperature Sensor
30. Purge Valve (Equipped Models)
31. Crankshaft Sensor
32. Fuel Injectors
33. Subthrottle Valve Actuator
34. Main Throttle Sensor
35. Subthrottle Sensor
36. Intake Air Pressure Sensor #2
37. Intake Air Pressure Sensor #1
38. Water Temperature Sensor
39. Vehicle-down Sensor
40. Front Oxygen Sensor
41. Gear Positon Switch
42. Rear Oxygen Sensor (Equipped Models)
43. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector

## Self-diagnosis System

### DFI System (other than ABS Equipped Models)

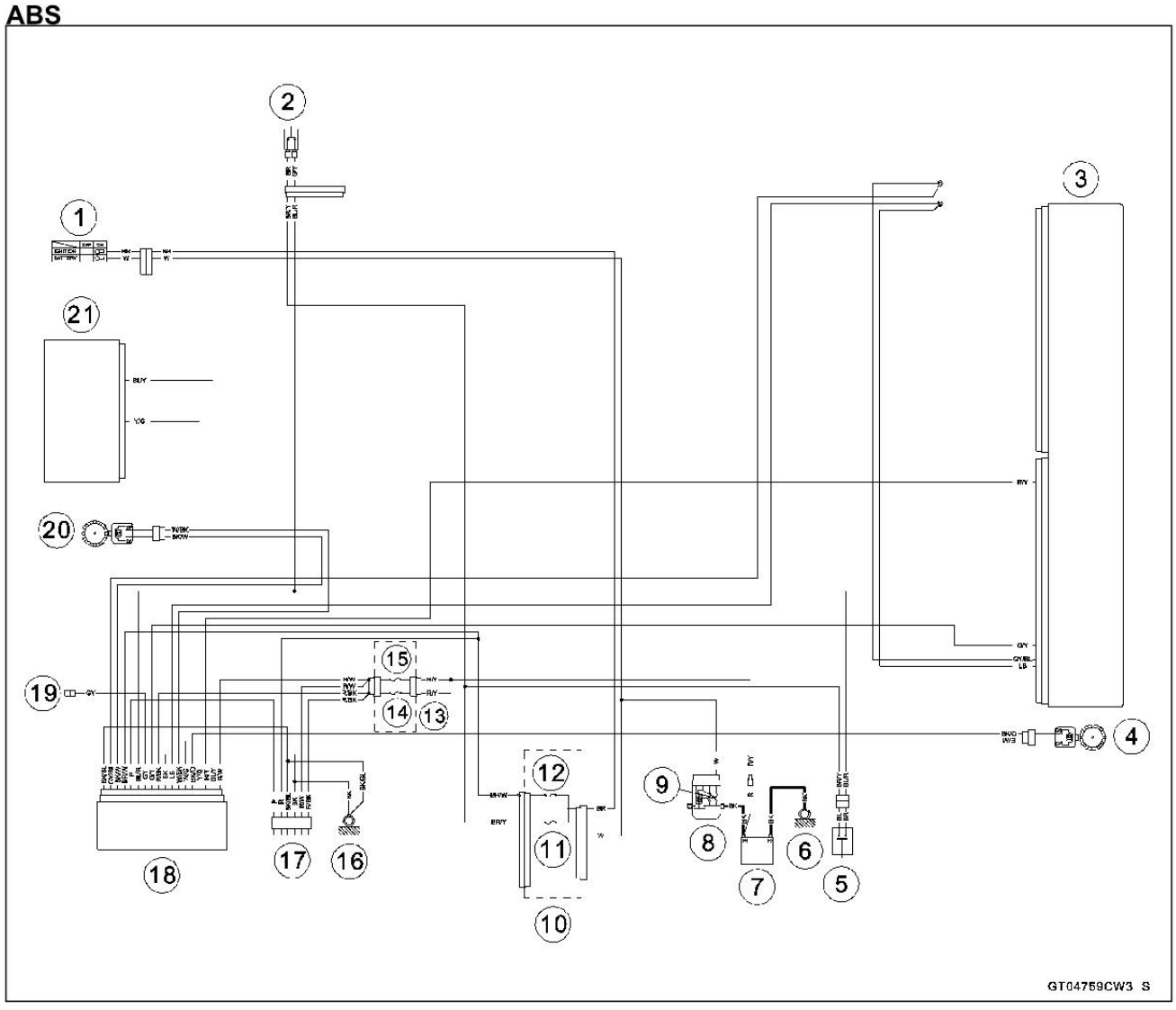


## Self-diagnosis System

1. ECU
2. Rear Wheel Rotation Sensor
3. Exhaust Butterfly Valve Actuator
4. Quick Shifter Sensor
5. Fuel Pump
6. Frame Grounds
7. Engine Ground
8. Battery
9. Starter Relay
10. Main Fuse 30 A
11. ECU Fuse 15 A
12. Relay Box
13. Fuel Pump Relay
14. ECU Main Relay
15. Radiator Fan Relay
16. Fuse Box (1)
17. Radiator Fan Fuse 15 A
18. Ignition Fuse 15 A
19. Front Wheel Rotation Sensor
20. Meter Unit
21. Ignition Switch
22. Engine Stop Switch
23. Air Switching Valve
24. Radiator Fan Motor
25. Stick Coils
26. Intake Air Temperature Sensor
27. Purge Valve (Equipped Models)
28. Crankshaft Sensor
29. Fuel Injectors
30. Subthrottle Valve Actuator
31. Main Throttle Sensor
32. Subthrottle Sensor
33. Intake Air Pressure Sensor #2
34. Intake Air Pressure Sensor #1
35. Water Temperature Sensor
36. Vehicle-down Sensor
37. Front Oxygen Sensor
38. Gear Positon Switch
39. Kawasaki Diagnostic System Connector

## Self-diagnosis System

### ABS




1. Ignition Switch
2. Front Brake Light Switch
3. ECU
4. Rear Wheel Rotation Sensor
5. Rear Brake Light Switch
6. Engine Ground
7. Battery
8. Starter Relay
9. Main Fuse 30 A
10. Fuse Box (1)
11. Brake Light/Horn Fuse 7.5 A
12. Ignition Fuse 15 A
13. Fuse Box (3)
14. ABS Solenoid Valve Relay Fuse 15 A
15. ABS Motor Relay Fuse 25 A
16. Frame Ground
17. ABS Kawasaki Diagnosis System Connector
18. ABS Hydraulic Unit
19. ABS Self-diagnosis Terminal
20. Front Wheel Rotation Sensor
21. Meter Unit

## Self-diagnosis System

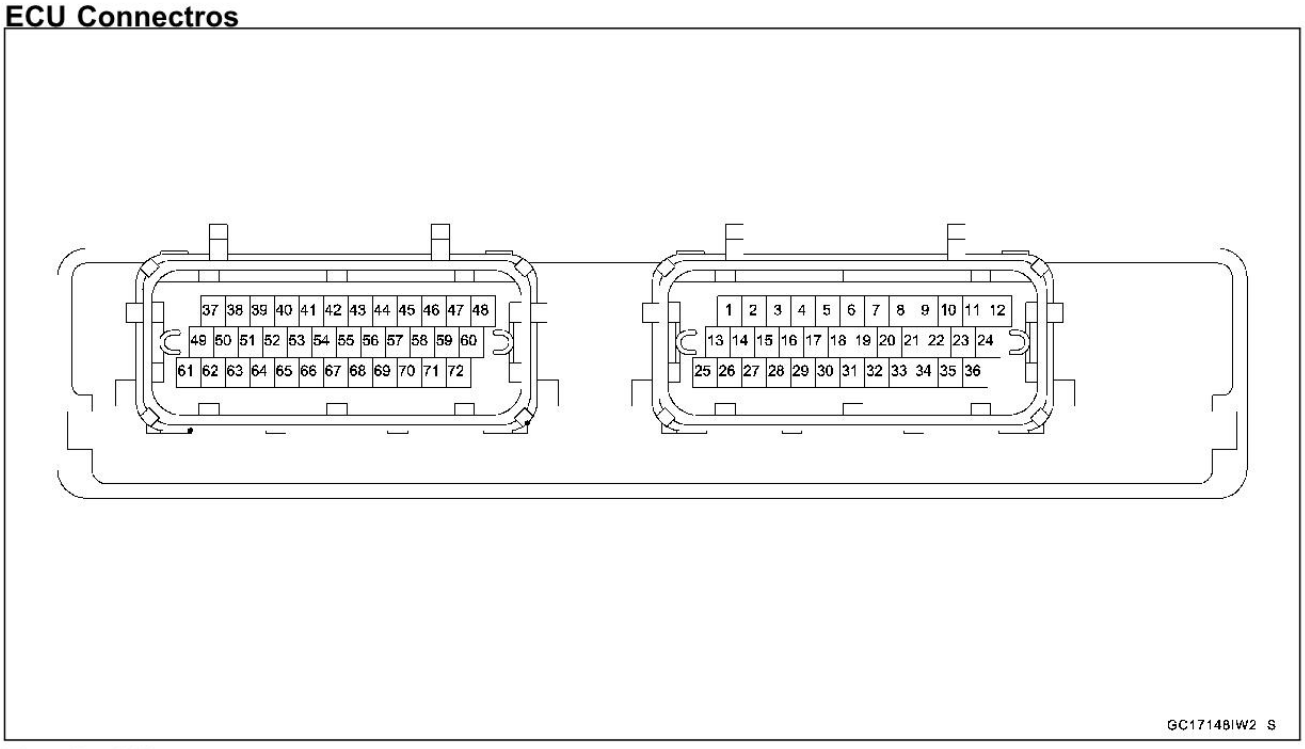
○Color Codes:

| | | |
|---|---|---|
| BK: Black | GY: Gray | PU: Purple |
| BL: Blue | LB: Light Blue | R: Red |
| BR: Brown | LG: Light Green | V: Violet |
| CH: Chocolate | O: Orange | W: White |
| DG: Dark Green | P: Pink | Y: Yellow |
| G: Green | | |

## Self-diagnosis System

### *Terminal Numbers of Connectors*

**ECU Connectros**




**Terminal Names**

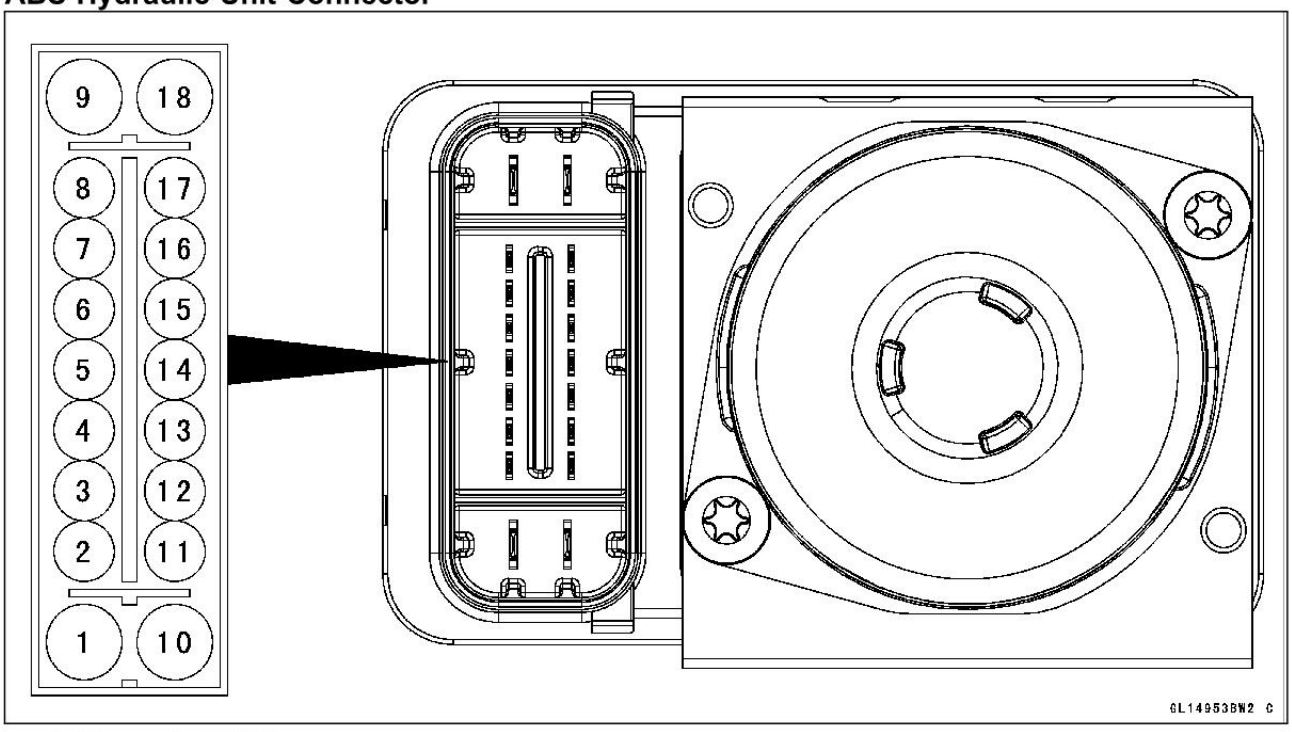
1. Power Supply to ECU (from ECU Main Relay): BR/W
2. Power Supply to ECU (from Battery): W/BK
3. Unused
4. Gear Position Sensor: G/R
5. Unused
6. CAN Communication Line (Low): LB
7. CAN Communication Line (High): GY/BL
8. Intake Air Pressure Sensor #2: G/W
9. Front Wheel Rotation Sensor Signal (ZX636J): G/Y
10. Front Wheel Rotation Sensor (ZX636K): G/Y
11. Unused
12. Subthrottle Valve Actuator: P/BL
13. Power Supply to Sensors: BL
14. Rear Oxygen Sensor (–) (Equipped Models): G/O
15. Rear Oxygen Sensor (+) (Equipped Models): GY/BK
16. Front Oxygen Sensor (+): BL/Y
17. Intake Air Pressure Sensor #1: Y/BL
18. Water Temperature Sensor: W
19. Main Throttle Sensor: Y/W
20. Subthrottle Sensor: BL/W
21. Rear Wheel Rotation Sensor Output: P
22. Unused
23. Subthrottle Valve Actuator: G
24. Subthrottle Valve Actuator: Y/BK
25. Ground for Control System: BK/BL
26. External Communication Line (Immobilizer System (Equipped Models)/Kawasaki Diagnostic System): LG/BK
27. Unused
28. Front Oxygen Sensor (–): G/BL
29. Ground for Sensors: G
30. Intake Air Temperature Sensor: R/BK
31. Vehicle-down Sensor: Y/G
32. Exhaust Butterfly Valve Actuator Sensor: GY

## Self-diagnosis System

33. Rear Wheel Rotation Sensor Signal (ZX636J): R/Y
34. Rear Wheel Rotation Sensor (ZX636K): R/Y
35. Ground: BK/BL
36. Subthrottle Valve Actuator: BK/O
37. Stick Coil #1: BK
38. Stick Coil #3: BK/O
39. Fuel Injector #1: BL/BK
40. Fuel Injector #3: BL/O
41. Radiator Fan Relay: Y/BL
42. Upper Button: P/BL
43. Rear Oxygen Sensor Heater (Equipped Models): LB
44. Front Oxygen Sensor Heater: P/BK
45. Air Switching Valve: R/BL
46. Purge Valve (Equipped Models): R/Y
47. Exhaust Butterfly Valve Actuator (+): W/R
48. Meter Communication Line: BL/BK
49. Stick Coil #2: BK/R
50. Stick Coil #4: BK/G
51. Fuel Injector #2: BL/R
52. Fuel Injector #4: BL/G
53. Starter Lockout Switch: R/G
54. Lower Button: Y/R
55. Yellow KTRC Indicator Light: G/R
56. Crankshaft Sensor (+): Y
57. Crankshaft Sensor (–): Y/BK
58. Immobilizer Amplifier (Equipped Models): P/BK
59. Exhaust Butterfly Valve Actuator (–): W/BL
60. Immobilizer Amplifier (Equipped Models): V
61. Ground for Ignition System: BK/Y
62. Starter Button: R/BK
63. Ground for Fuel System: BK/Y
64. Side Stand Switch: G/BK
65. Fuel Pump Relay: BR/Y
66. SEL Button: G/W
67. Engine Stop Switch: R
68. Meter Unit (Tachometer): LB
69. Unused
70. External Communication Line (Immobilizer System (Equipped Models)/Kawasaki Diagnostic System): GY/W
71. Power Supply to Wheel Rotation Sensors (ZX636K): W/Y
72. Quick Shifter Sensor: G/Y

## Self-diagnosis System

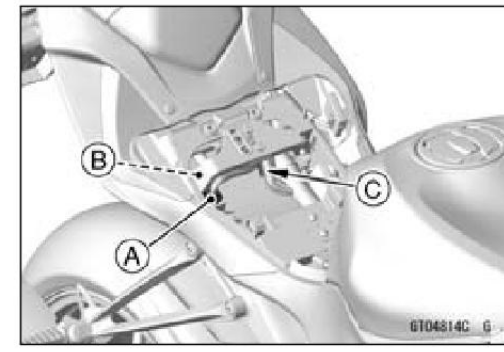
### ABS Hydraulic Unit Connector



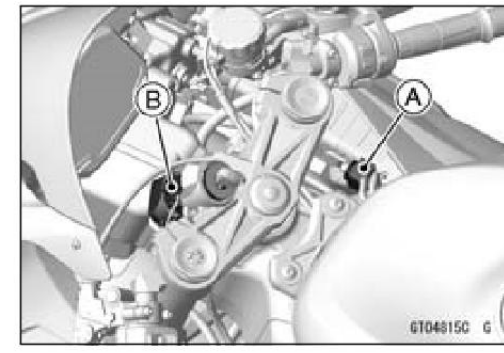

1. Ground: BK/BL
2. CAN Communication Line (High): GY/BL
3. Front Wheel Rotation Sensor Signal Input: BK/W
4. Power Supply: BR/W
5. ABS Kawasaki Diagnosis System Connector: P
6. Front and Rear Brake Light Switch Signal: BL/R
7. ABS Self-diagnosis Terminal: GY
8. Front Wheel Rotation Sensor Signal Output: G/Y
9. Power Supply to ABS Solenoid Valve Relay: R/BK
10. Ground to Motor: BK
11. CAN Communication Line (Low): LB
12. Power Supply to Front Wheel Rotation Sensor: W/BK
13. Power Supply to Rear Wheel Rotation Sensor: W/G
14. Rear Wheel Rotation Sensor Signal Input: BK/O
15. KIBS Warning Message: Y/G
16. Rear Wheel Rotation Sensor Signal Output: R/Y
17. Yellow ABS Indicator Light: BL/Y
18. Power Supply to ABS Motor Relay: R/W

## Parts Location

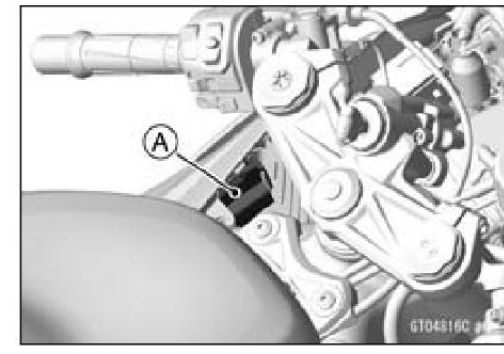
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [A]
ABS Kawasaki Diagnosis System Connector [B] (Equipped Models)
ABS Self-diagnosis Terminal [C] (Equipped Models)



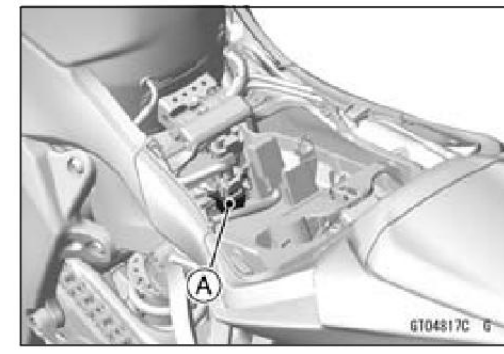

Purge Valve [A] (Equipped Models)
Immobilizer Antenna (in Ignition Switch) [B] (Equipped Models)



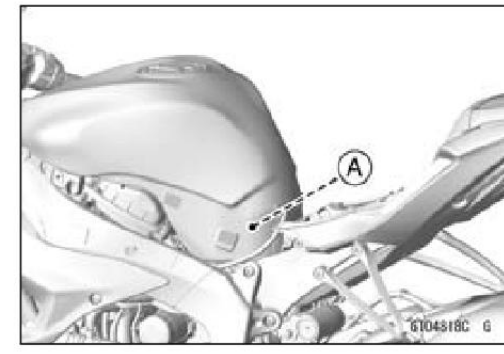

Immobilizer Amplifier [A] (Equipped Models)




Vehicle-down Sensor [A]

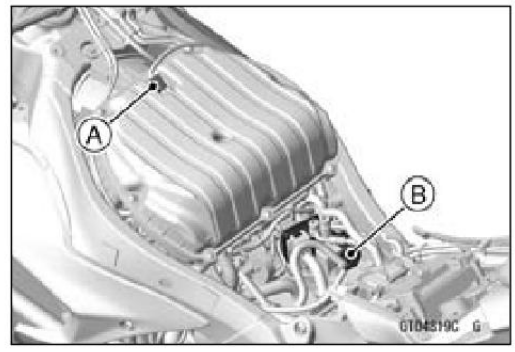



Fuel Pump [A]

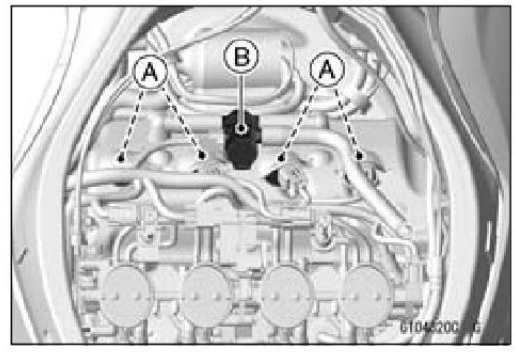


## Parts Location

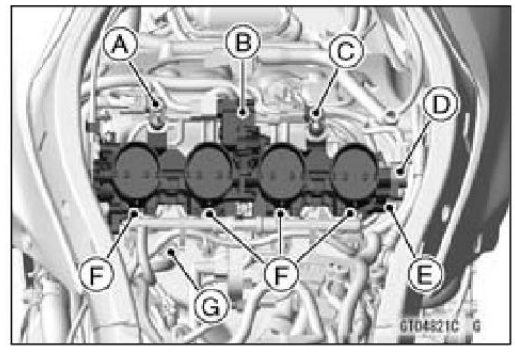
Intake Air Temperature Sensor [A]
ABS Hydraulic Unit [B]



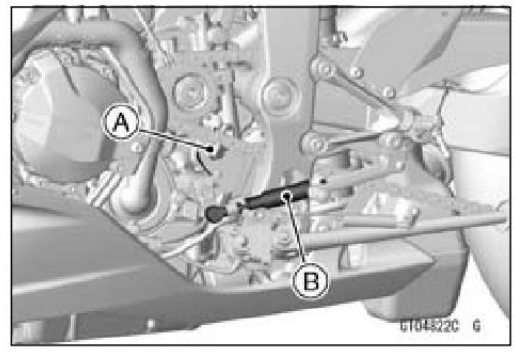

Stick Coils [A]
Air Switching Valve [B]



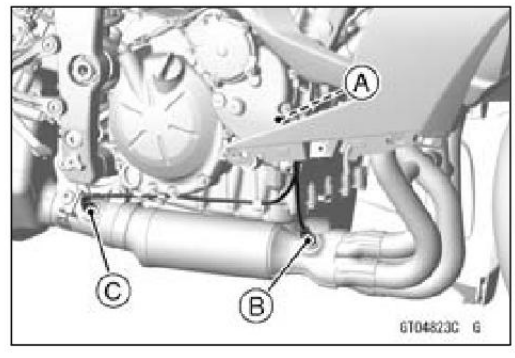

Intake Air Pressure Sensor #1 [A]
Subthrottle Valve Actuator [B]
Intake Air Pressure Sensor #2 [C]
Subthrottle Sensor [D]
Main Throttle Sensor [E]
Fuel Injectors [F]
Water Temperature [G]




Gear Position Switch [A]
Quick Shifter Sensor [B]

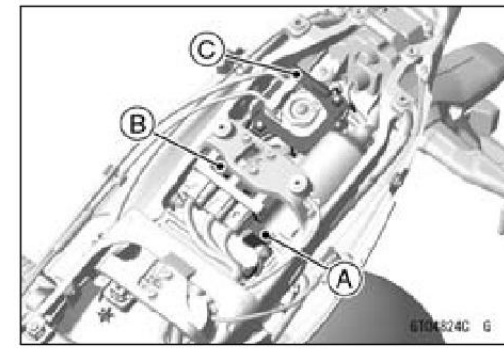



Crankshaft Sensor [A]
Front Oxygen Sensor [B]
Rear Oxygen Sensor [C] (Equipped Models)

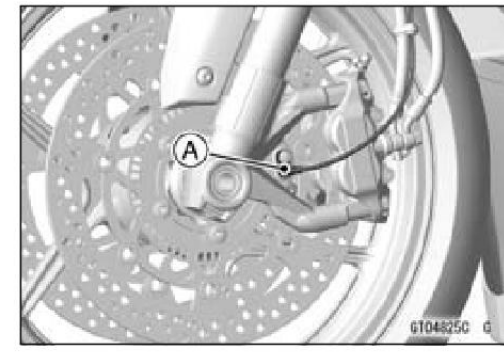


## Parts Location

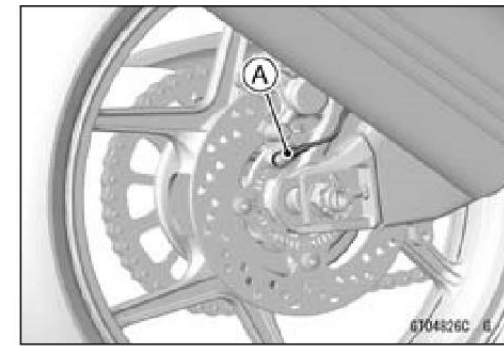
ECU [A]
Relay Box [B]
Exhaust Butterfly Valve Actuator [C]




Front Wheel Rotation Sensor [A]




Rear Wheel Rotation Sensor [A]

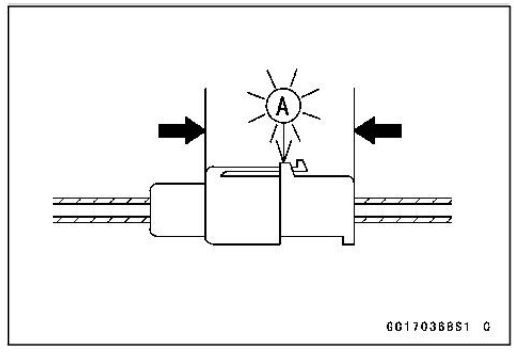


## Servicing Precautions

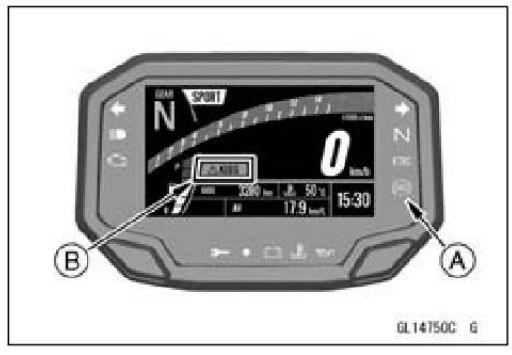
### *Servicing Precautions*

There are a number of important precautions that should be followed servicing the self-diagnosis system.

- This self-diagnosis system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the self-diagnosis system parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Do not turn the ignition switch on while any of the electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, connectors, leads, and wiring.
- Whenever the electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].




- If a transceiver is installed on the motorcycle, make sure that the operation of the self-diagnosis system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- The self-diagnosis system parts can not be disassembled. Even if a fault is found, do not try to disassemble and repair the self-diagnosis system parts, replace it.
- The yellow ABS indicator light [A] and KIBS warning message [B] may come on if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light comes on, remedy the problem and clear the service code.




**⚠ WARNING**

**Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.**

## Servicing Precautions

- The yellow ABS indicator light may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code.
- Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator light does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (19 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (the reaction force generated is felt in the brake lever and pedal). This completes the final inspection.

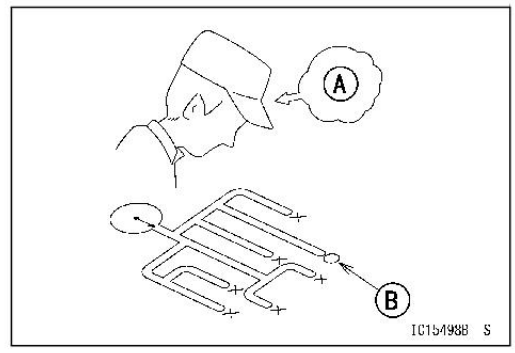
## Troubleshooting

### *Outline*

When a problem occurs with self-diagnosis system, the appropriate indicator light goes on or blinks to alert the rider.

When the indicator light remains on, for first ask the rider about the conditions [A] of trouble, and then start to determine the cause [B] of problem.

Don't rely solely on the self-diagnosis function, use common sense.




When the repair has been done, erase the service code.

When the motorcycle is down, the vehicle-down sensor operates and the ECU shuts off the fuel pump relay, fuel injector and ignition system. The ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

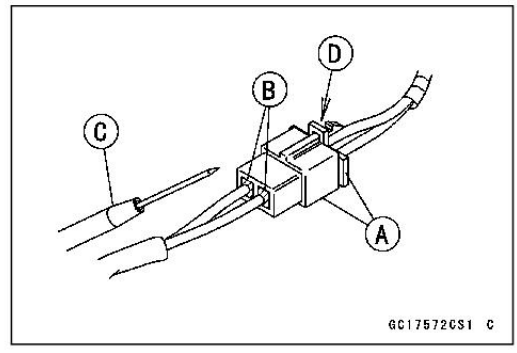
- When checking the self-diagnosis system parts, use a digital meter which can be read two decimal place voltage or resistance.

○The self-diagnosis system part connectors [A] have seals [B].

- When measuring the input or output voltage with the connector joined, use the needle adapter set [C].

**Special Tool - Needle Adapter Set: 57001-1874**

- Insert the needle adapters inside the seals from behind the connector until the adapter reaches the terminal.




| *NOTICE* |
| --- |
| **Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.** |

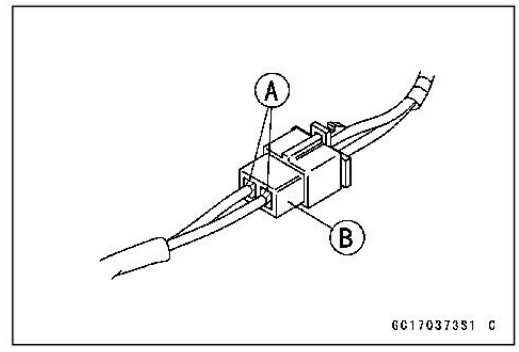
- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of a digital meter.
- Be careful not to short-circuit the leads of the electrical system parts by contact between adapters.
- Turn the ignition switch on and measure the voltage with the connector joined.

| *NOTICE* |
| --- |
| **Incorrect, reverse connection or short circuit by needle adapters could damage the electrical system parts.** |

## Troubleshooting

○After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

**Sealant - Liquid Gasket, TB1211: 56019-120**




- Always check battery condition before replacing the self-diagnosis system parts. A fully charged battery is a must for conducting accurate tests of the self-diagnosis system.
- Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure the coil winding resistance when the self-diagnosis system part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the self-diagnosis system.

★If any wiring is deteriorated, replace the wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

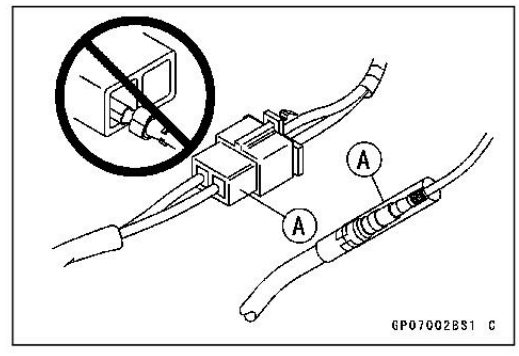
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

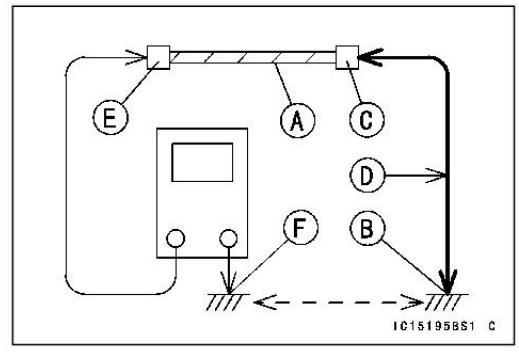
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a digital meter between the ends of the leads.

★If the digital meter does not read about 0 Ω, the lead is defective. Replace the lead or the main harness.

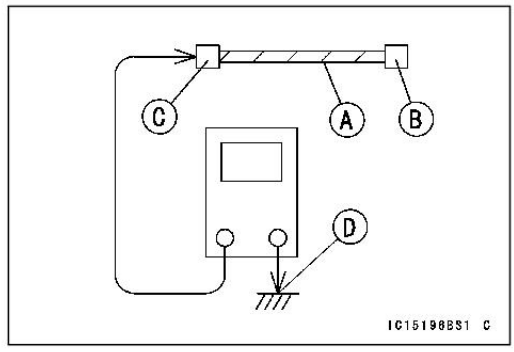



○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



## Troubleshooting

○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.




- Narrow down suspicious locations by repeating the continuity tests.

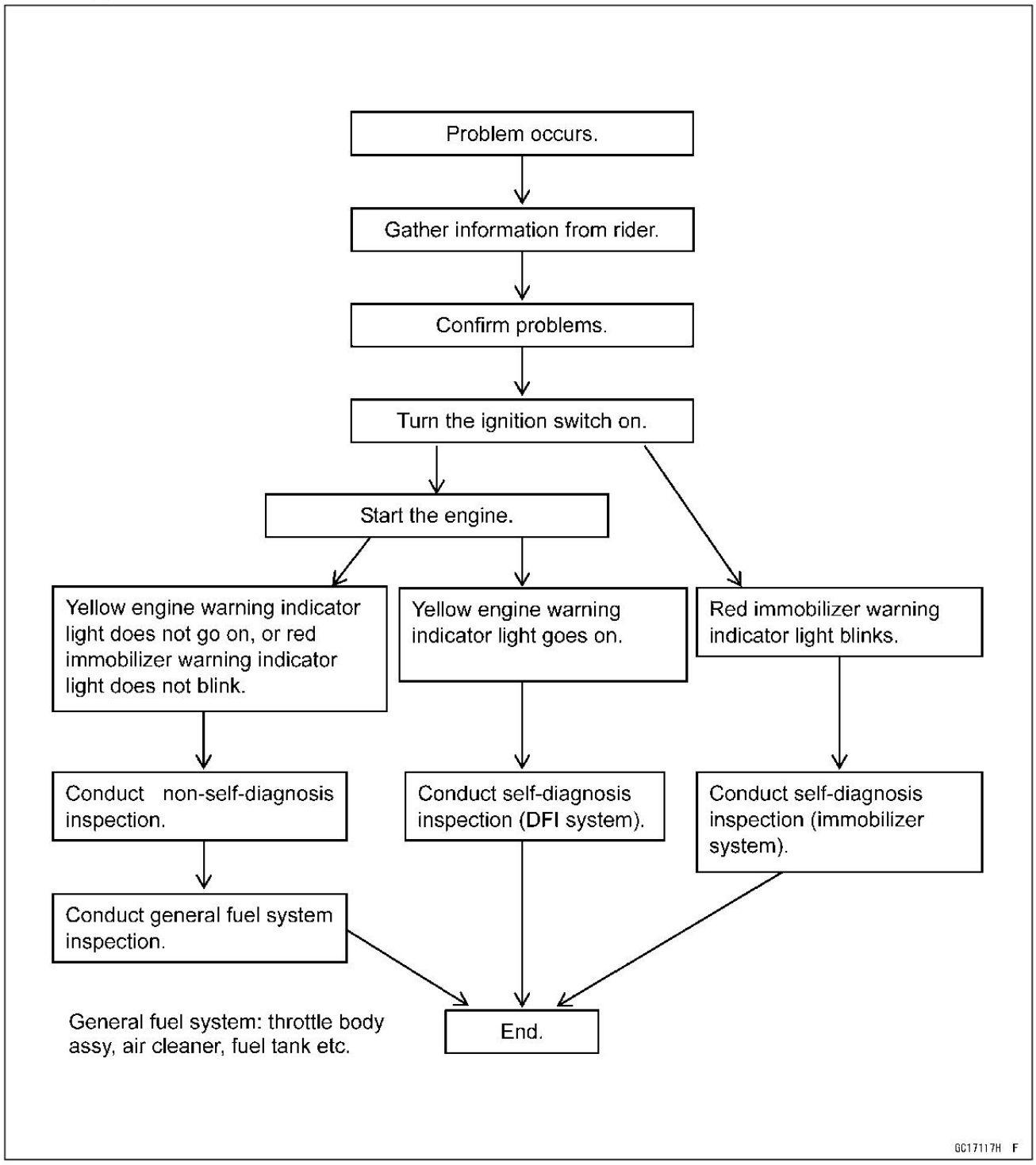
★If no abnormality is found in the wiring or connectors, the self-diagnosis system parts are the next likely suspects. Check each part one by one.

★If an abnormality is found, replace the affected self-diagnosis system part.

★If no abnormality is found in the wiring, connectors, and self-diagnosis system parts, replace the ECU.

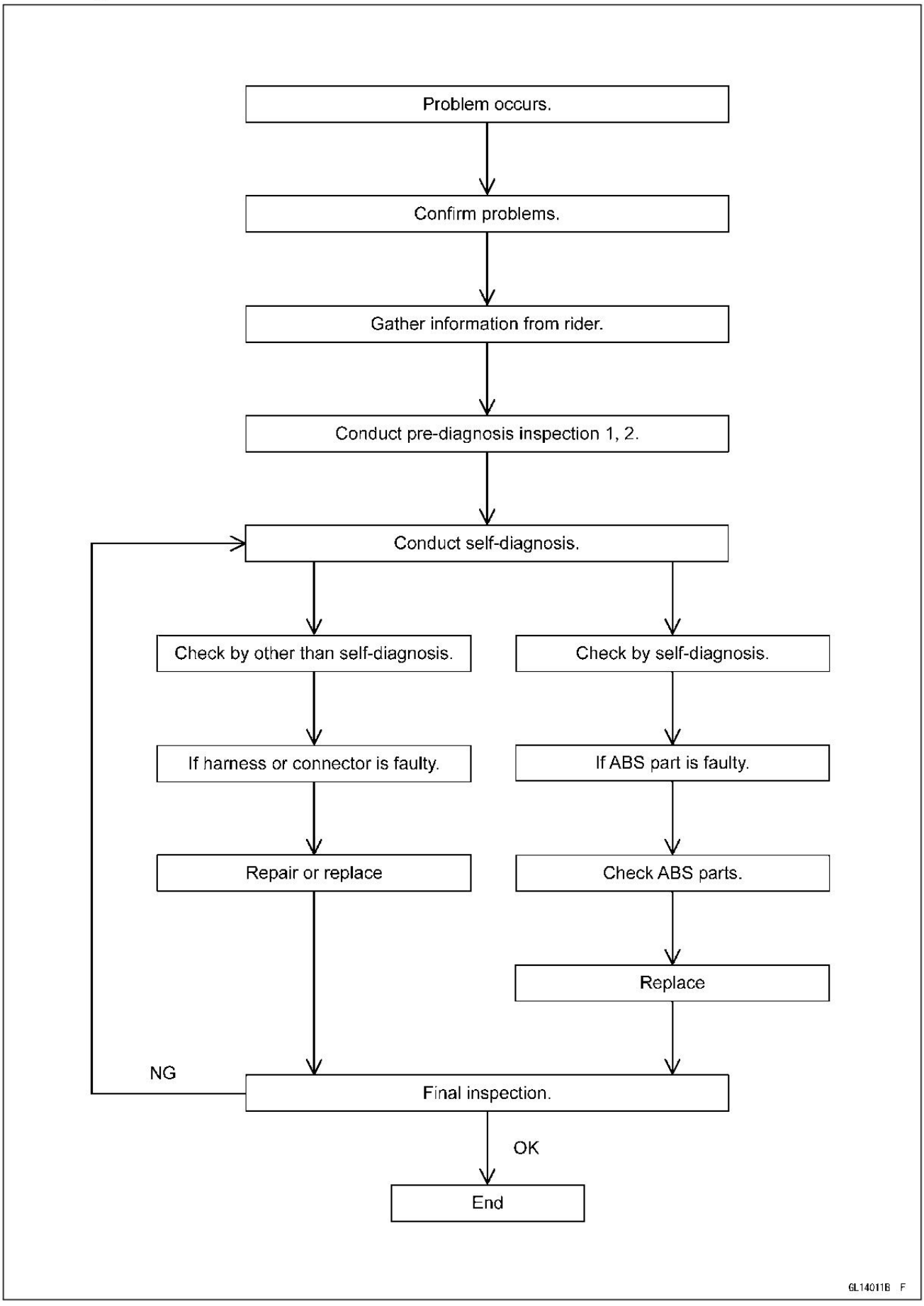
## Troubleshooting

### DFI Diagnosis Flow Chart


Problem occurs.
Gather information from rider.
Confirm problems.
Turn the ignition switch on.
Start the engine.
Yellow engine warning indicator light does not go on, or red immobilizer warning indicator light does not blink.
Yellow engine warning indicator light goes on.
Red immobilizer warning indicator light blinks.
Conduct non-self-diagnosis inspection.
Conduct self-diagnosis inspection (DFI system).
Conduct self-diagnosis inspection (immobilizer system).
Conduct general fuel system inspection.
General fuel system: throttle body assy, air cleaner, fuel tank etc.
End.
GC17117H F

## Troubleshooting

### ABS Diagnosis Flow Chart



## Troubleshooting

### *Inquiries to Rider*

○Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
○Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
○The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

### Sample Diagnosis Sheet (DFI System)

| | | |
|---|---|---|
| **Rider name:** | **Registration No. (license plate No.):** | **Year of initial registration:** |
| **Model:** | **Engine No.:** | **Frame No.:** |
| **Date problem occurred:** | | **Mileage:** |
| **Environment when problem occurred.** | | |
| Weather | ☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other: | |
| Temperature | ☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other: | |
| Problem frequency | ☐ chronic, ☐ often, ☐once | |
| Road | ☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble | |
| Altitude | ☐ normal, ☐ high (about 1 000 m or more) | |
| **Motorcycle conditions when problem occurred.** | | |
| Yellow engine warning indicator light | ☐ goes on immediately after turning the ignition switch on, and goes off after starting the engine (normal) | |
| | ☐ goes on immediately after turning the ignition switch on, and stays on after starting the engine (DFI problem) | |
| | ☐ does not go on after turning the ignition switch on (indicator light, meter unit fault) | |
| Red immobilizer warning indicator light | ☐ Starts blinking after ignition switch on (immobilizer system problem). | |
| | ☐ Does not go on after ignition switch on (ECU or meter unit fault). | |
| Starting difficulty | ☐ starter motor not rotating. | |
| | ☐ starter motor rotating but engine do not turn over. | |
| | ☐ starter motor and engine do not turn over. | |
| | ☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound). | |
| | ☐ no spark. | |
| | ☐ other: | |
| Engine stalls | ☐ right after starting. | |
| | ☐ when opening throttle grip. | |
| | ☐ when closing throttle grip. | |
| | ☐ when moving off. | |
| | ☐ when stopping the motorcycle. | |
| | ☐ when cruising. | |
| | ☐ other: | |

## Troubleshooting

| | |
|---|---|
| Poor running at low speed | ☐ very low idle speed, ☐ very high idle speed, ☐ rough idle speed. |
| | ☐ battery voltage is low (charge the battery). |
| | ☐ spark plug loose (tighten it). |
| | ☐ spark plug dirty, broken, or gap maladjusted. |
| | ☐ backfiring. |
| | ☐ afterfiring. |
| | ☐ hesitation when acceleration. |
| | ☐ engine oil viscosity too high. |
| | ☐ brake dragging. |
| | ☐ engine overheating. |
| | ☐ clutch slipping. |
| | ☐ other: |
| Poor running or no power at high speed | ☐ spark plug loose (tighten it). |
| | ☐ spark plug dirty, broken, or gap maladjusted. |
| | ☐ spark plug incorrect (replace it). |
| | ☐ knocking (fuel poor quality or incorrect, → use high-octane gasoline). |
| | ☐ brake dragging. |
| | ☐ clutch slipping. |
| | ☐ engine overheating. |
| | ☐ engine oil level too high. |
| | ☐ engine oil viscosity too high. |
| | ☐ other: |

## *Inquiries to Rider*

- Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
- The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

### Sample Diagnosis Sheet 1

Rider Name: ..... Registration No. (license plate No.): .....
Date of registration: ..... Model: .....
Vin No.: ..... Odometer reading: ..... km or miles
Engine No.: ..... Odometer reading when problem first occured: ..... km or miles

| Question | Description | | | Answer | Advice to customer |
|---|---|---|---|---|---|
| Which statement/s best describes the fault with the ABS system? | *Yellow ABS indicator light illuminated?* | *Flashing* | | | A fault has been detected with the ABS system. |
| | | *Continuous* | | | |
| | | *Not working* | | | |
| | *ABS not working* | | | | Further inspection by technician required. |
| | *ABS operates too frequently* | | | | Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently. |
| | *Stopping distance too long* | | | | |
| | *Does the wheel lock when you apply the brakes* | | | | Further inspection by technician required. |
| | *Brake can't be released* | | | | |
| | *Other* | | | | |
| Do the front and rear brake levers feel normal during application? | *Normal* | | | | Further inspection by technician required. |
| | *Abnormal* | *Long stroke (lever feels soft and moves back close to the handle bar)* | | | This indicates a probable fault with the braking system and should be inspected immediately. |
| | | *Limited stroke (lever feels hard and has little movement)* | | | |
| | | *Pulsing/vibrating* | | | |
| | *Which lever? (front, rear or both)* | | | | |
| When does the fault occur? | *During start up / stationary* | *(Is a centre stand or service stand used)* | | | If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer. |
| | *Driving below 6 km/h (4mph) (Speeds vary depending on model)* | | | | The ABS system is not active at these speeds. |
| | *Driving above 6 km/h (4mph) (Speeds vary depending on model)* | | | | This may be normal ABS operation if the road conditions are poor. |
| | *When slowing or stopping (Rate of brake application)* | *Gradual braking* | *front only* | | |
| | | | *rear only* | | |
| | | | *both brakes* | | |
| | | *During abrupt braking* | *front only* | | Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation. |
| | | | *rear only* | | |
| | | | *both brakes* | | |
| | | *There is no specific pattern* | | | |
| | *Other* | | | | |

## Troubleshooting

| Question | Description | | Answer | Advice to customer |
|---|---|---|---|---|
| How often does the fault occur? | *Every time ignition is switched on* | | | Further inspection by technician required. |
| | *Every time the brakes are used (Continually)* | | | |
| | *No regularity (Intermittent)* | | | |
| | *Other* | | | |
| During which riding conditions does the fault occur? | *Highway riding* | *Any comment on riding style maybe applicable.* | | Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent. |
| | *City riding* | | | Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically. |
| | *Minor/country roads riding* | | | Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently. |
| | *Cross country riding* | | | Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically. |
| | *Track/closed circuit riding* | | | Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically. |
| | *All* | | | Further inspection by technician required. |
| In what road conditions does the problem occur? | *Dry* | | | Further inspection by technician required. |
| | *Wet* | | | In wet conditions it is possible that the ABS is operating normally |
| | *Snow/Ice* | | | In snow/icy conditions it is possible that the ABS is operating normally |
| | *Loose/rough surface (gravel)* | | | On loose/rough surfaces it is possible that the ABS is operating normally |
| Motorcycle condition | *Has the machine been regularly serviced according to the periodic maintenance schedule?* | | | If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged. |
| | *Have there been any previous braking problems?* | | | Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible. |
| | *Have any aftermarket parts been fitted?* | *OE Tires and brakes?* | | Further inspection by technician required. |
| | *Have the daily safety checks been carried out? (tire pressures / condition etc.)* | | | Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure. |

## Troubleshooting

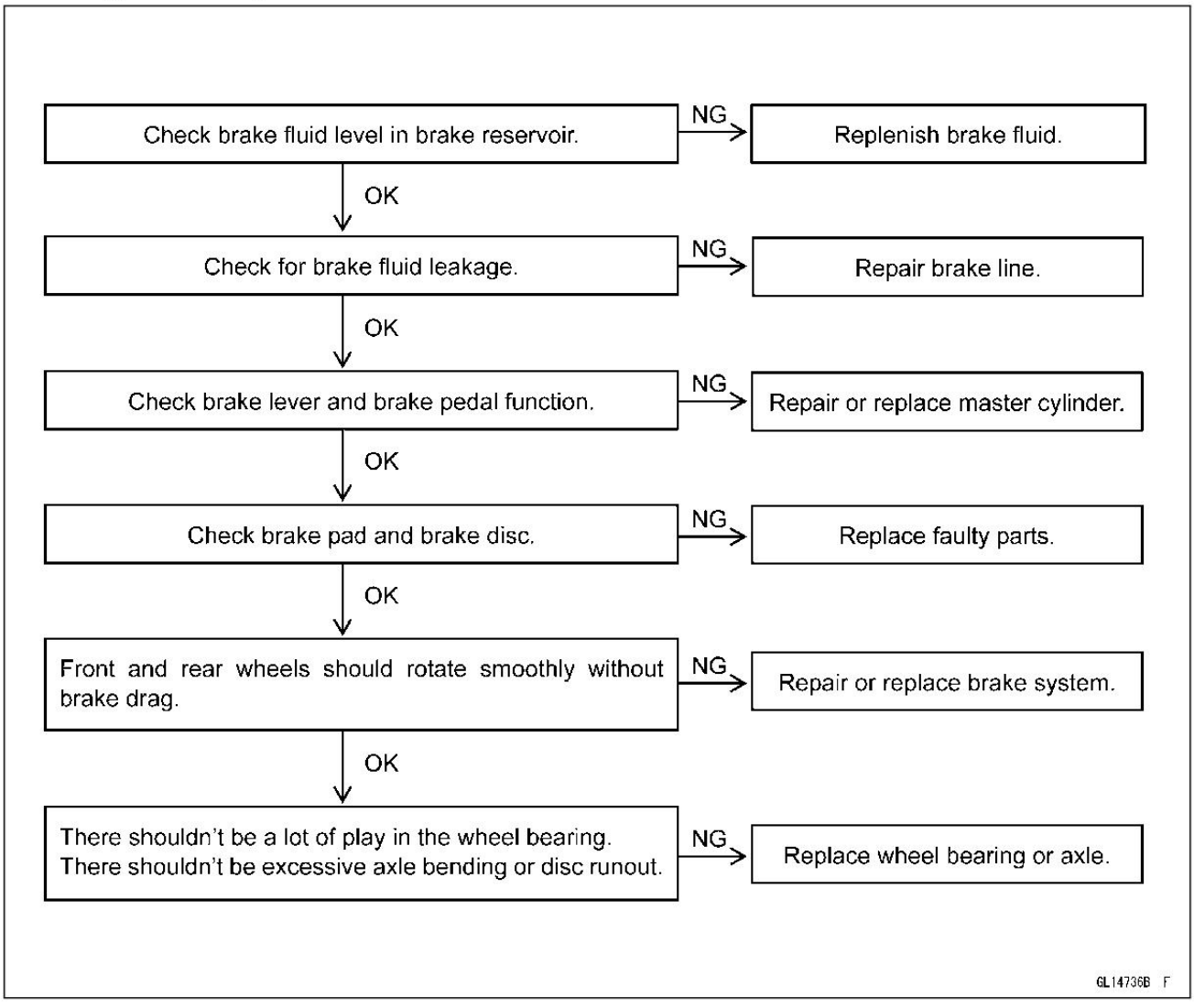
### *Dealer Findings*

**Sample Diagnosis Sheet 2**

| Question/Action | Description | | Answer | Advice to technician |
|---|---|---|---|---|
| Review customer feedback information | *Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.* | | | |
| Check to see if any diagnostic codes are present | *1* | | | If codes are present refer to service manual. |
| | *2* | | | |
| | *3* | | | |
| | *4* | | | |
| | *5* | | | |
| Inspect the following | *Battery voltage* | | | The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed. |
| | *Tires type/size* | | Front .....<br>Rear ..... | Refer to service manual. |
| | *Tire pressures* | | Front .....<br>Rear ..... | |
| | *Tire condition* | | Front .....<br>Rear ..... | Excessive or abnormal wear can be recognized as an ABS fault. |
| | *Wheel rotation sensor air gap* | | Front .....<br>Rear ..... | Refer to service manual. Also check that the wheel orientation is correct. |
| | *Wheel condition (damaged or deformed)* | | Front .....<br>Rear ..... | Refer to service manual. |
| | *Brake system general condition* | | Front .....<br>Rear ..... | Pad wear/Front and rear operation/Condition of hoses etc. |
| | *Brake disc run-out* | | Front .....<br>Rear ..... | Refer to service manual. |
| Additional information on the yellow ABS indicator light | *Continuous* | *Stays on all the time while ignition on* | | Check for diagnostic trouble codes. |
| | | *Turns off when first moving off but turns on again and stays on* | | |
| | | *Turns on when brake(s) are operated* | | |
| | | *Other:* | | |
| | *Not working* | *Turns off soon after moving off* | | Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual. |
| | | *Turns off after riding for a while* | | |
| | | *Other:* | | |
| | *How many times does it flash per 10 seconds?* | | 5, 15, or 20 | By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)* |
| | | | Other: ..... times | |

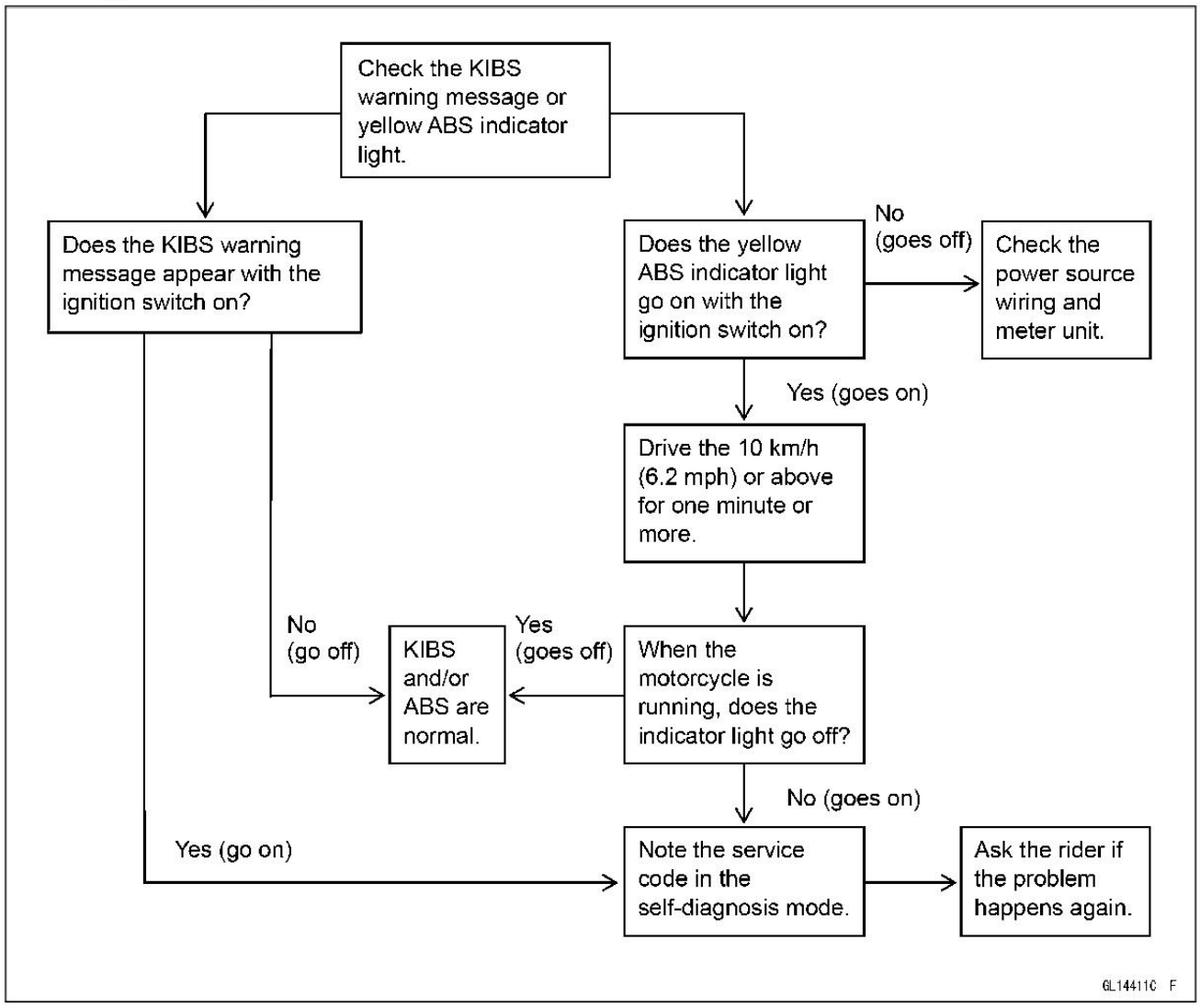
## Troubleshooting

### *ABS Pre-Diagnosis Inspection*
### Pre-Diagnosis Inspection 1



## Troubleshooting

### Pre-Diagnosis Inspection 2


Check the KIBS warning message or yellow ABS indicator light.
Does the KIBS warning message appear with the ignition switch on?
Does the yellow ABS indicator light go on with the ignition switch on?
No (goes off)
Check the power source wiring and meter unit.
Yes (goes on)
Drive the 10 km/h (6.2 mph) or above for one minute or more.
When the motorcycle is running, does the indicator light go off?
Yes (goes off)
No (go off)
KIBS and/or ABS are normal.
No (goes on)
Yes (go on)
Note the service code in the self-diagnosis mode.
Ask the rider if the problem happens again.
GL14411C F

## Troubleshooting

### *Troubleshooting Guide (DFI System)*

**NOTE**

- *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*
- *The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

### Engine Won't Turn Over

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| Gear position, starter lockout or side stand switch trouble | Inspect each sensor or switch (see chapter 16 or 17). |
| Immobilizer system trouble | Inspect (see chapter 17). |
| Vehicle-down sensor operated | Turn ignition switch off (see chapter 17). |
| Vehicle-down sensor trouble | Inspect (see chapter 17). |
| Crankshaft sensor trouble | Inspect (see chapter 16). |
| Stick coil shorted or not in good contact | Inspect or reinstall (see chapter 16). |
| Stick coil trouble | Inspect (see chapter 16). |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Spark plug incorrect | Replace it with the correct plug (see chapter 2). |
| ECU ground and power supply trouble | Inspect (see chapter 3). |
| ECU trouble | Inspect (see chapter 3). |
| No or little fuel in tank | Supply fuel (see Owner's Manual). |
| Fuel injector trouble | Inspect and replace (see chapter 17). |
| Fuel pump not operating | Inspect (see chapter 3). |
| Fuel pump relay trouble | Inspect and replace (see chapter 16). |
| Fuel filter clogged | Replace fuel filter (see chapter 2). |
| Fuel pressure regulator trouble | Inspect fuel pressure and replace fuel pump (see chapter 3). |
| Fuel line clogged | Inspect and repair (see chapter 3). |

### Poor Running at Low Speed

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| **Spark weak:** | |
| Stick coil shorted or not in good contact | Inspect or reinstall (see chapter 16). |
| Stick coil trouble | Inspect (see chapter 16). |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Spark plug incorrect | Replace it with the correct plug (see chapter 2). |
| ECU trouble | Inspect (see chapter 3). |
| **Fuel/air mixture incorrect:** | |
| Little fuel in tank | Supply fuel (see Owner's Manual). |
| Air cleaner clogged, poorly sealed, or missing | Clean element or inspect sealing (see chapter 2). |
| Air duct loose | Reinstall (see chapter 3). |
| Throttle body assy holder loose | Reinstall (see chapter 3). |
| Throttle body assy dust seal damage | Replace (see chapter 3). |
| Fuel injector O-ring damage | Replace (see chapter 3). |

## Troubleshooting

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| Fuel filter clogged | Replace fuel filter (see chapter 2). |
| Fuel pressure regulator trouble | Inspect fuel pressure and replace fuel pump (see chapter 3). |
| Fuel line clogged | Inspect and repair (see chapter 3). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| **Unstable (rough) idling:** | |
| Fuel pressure too low or too high | Inspect (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Engine vacuum not synchronizing | Inspect and adjust (see chapter 2). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| **Engine stalls easily:** | |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Stick coil trouble | Inspect (see chapter 16). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| Fuel pump trouble | Inspect (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Fuel pressure too low or too high | Inspect (see chapter 3). |
| Fuel pressure regulator trouble | Inspect fuel pressure and replace fuel pump (see chapter 3). |
| Fuel line clogged | Inspect and repair (see chapter 3). |
| **Poor acceleration:** | |
| Fuel pressure too low | Inspect (see chapter 3). |
| Water or foreign matter in fuel | Change fuel. Inspect and clean fuel system (see chapter 3). |
| Fuel filter clogged | Replace fuel filter (see chapter 2). |
| Fuel pump trouble | Inspect (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |

## Troubleshooting

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Stick coil trouble | Inspect (see chapter 16). |
| **Stumble:** | |
| Fuel pressure too low | Inspect (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| **Surge:** | |
| Unstable fuel pressure | Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel pump) (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| **Backfiring when deceleration:** | |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Fuel pressure too low | Inspect (see chapter 3). |
| Fuel pump trouble | Inspect (see chapter 3). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| Air switching valve trouble | Inspect and replace (see chapter 16). |
| Air suction valve trouble | Inspect and replace (see chapter 5). |
| **After fire:** | |
| Spark plug burned or gap maladjusted | Replace (see chapter 2). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |

## Troubleshooting

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| **Other:** | |
| Intermittent any DFI fault and its recovery | Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 17). |

## Poor Running or No Power at High Speed

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| **Firing incorrect:** | |
| Stick coil shorted or not in good contact | Inspect or reinstall (see chapter 16). |
| Stick coil trouble | Inspect (see chapter 16). |
| Spark plug dirty, broken or gap maladjusted | Inspect and replace (see chapter 16). |
| Spark plug incorrect | Replace it with the correct plug (see chapter 2). |
| ECU trouble | Inspect (see chapter 3). |
| **Fuel/air mixture incorrect:** | |
| Air cleaner clogged, poorly sealed, or missing | Clean element or inspect sealing (see chapter 2). |
| Air duct loose | Reinstall (see chapter 3). |
| Throttle body assy holder loose | Reinstall (see chapter 3). |
| Throttle body assy dust seal damage | Replace (see chapter 3). |
| Water or foreign matter in fuel | Change fuel. Inspect and clean fuel system (see chapter 3). |
| Fuel injector O-ring damage | Replace (see chapter 3). |
| Fuel injector clogged | Inspect and repair (see chapter 3). |
| Fuel line clogged | Inspect and repair (see chapter 3). |
| Fuel pump operates intermittently and often DFI fuse blows. | Fuel pump bearings may wear. Replace the fuel pump (see chapter 3). |
| Fuel pump trouble | Inspect (see chapter 3). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |
| Cracked or obstructed intake air pressure sensor #1 and #2 vacuum hoses | Inspect and repair or replace (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| Main throttle sensor trouble | Inspect (see chapter 17). |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| **Knocking:** | |
| Fuel poor quality or incorrect | Fuel change (Use the gasoline recommended in the chapter 1 General Specifications). |
| Spark plug incorrect | Replace it with the correct plug (see chapter 2). |
| Stick coil trouble | Inspect (see chapter 16). |
| ECU trouble | Inspect (see chapter 3). |
| Engine vacuum not synchronizing | Inspect and adjust (see chapter 2). |
| Intake air pressure sensor #1 trouble | Inspect (see chapter 17). |
| Intake air pressure sensor #2 trouble | Inspect (see chapter 17). |

## Troubleshooting

| Symptoms or Possible Causes | Actions (chapter) |
|---|---|
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| **Miscellaneous:** | |
| Subthrottle sensor trouble | Inspect (see chapter 17). |
| Subthrottle valve actuator trouble | Inspect (see chapter 17). |
| Throttle valves will not fully open | Inspect throttle cables and lever linkage (see chapter 3). |
| Engine overheating - Water temperature sensor or crankshaft sensor trouble | (see Overheating of Troubleshooting Guide in chapter 18) |
| Air switching valve trouble | Inspect and replace (see chapter 16). |
| Air suction valve trouble | Inspect and replace (see chapter 5). |
| **Exhaust Smokes Excessively:** | |
| **(Black smoke)** | |
| Air cleaner element clogged | Clean element (see chapter 2). |
| Fuel pressure too high | Inspect (see chapter 3). |
| Fuel injector trouble | Inspect (see chapter 17). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |
| **(Brown smoke)** | |
| Air duct loose | Reinstall (see chapter 3). |
| Fuel pressure too low | Inspect (see chapter 3). |
| Water temperature sensor trouble | Inspect (see chapter 17). |
| Intake air temperature sensor trouble | Inspect (see chapter 17). |

## Self-Diagnosis

### *Self-Diagnosis Outline (DFI System)*

The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

**User Mode**

The ECU notifies the rider of troubles by lighting or blinking the appropriate indicators and warning messages when DFI, ignition, KTRC, KQS, power mode and immobilizer system (equipped models) parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.

**Dealer Mode**

The LCD displays the service code(s) to show the problem(s) which the above system has at the moment of diagnosis.

### *Self-Diagnosis Outline (ABS)*

When the indicator light has blinked or come on, the ABS hydraulic unit memorizes the service code.

The ABS hydraulic unit can memorize up to six service codes. If there is no fault, only the start code 12 is shown, indicating that “The ABS is normal.”

### *Self-Diagnosis Procedures (DFI System)*

**NOTE**

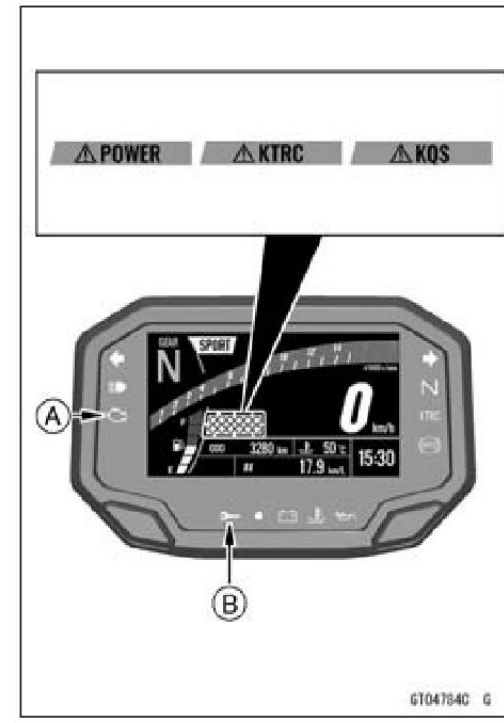
○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the warning indicator light and warning message do not light or blink.*

● Turn the ignition switch on and start the engine.

○When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light [A] stays on after starting the engine to alert the rider.

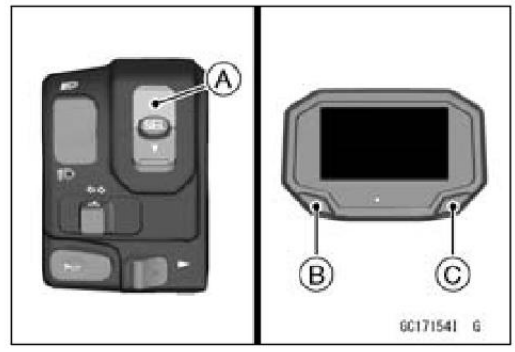
○When a problem occurs with KTRC, KQS and power mode system, the warning messages appear.

○When a problem occurs with immobilizer system (equipped models), the red immobilizer warning indicator light [B] blinks.



## Self-Diagnosis

- Push the upper button [A] or left meter button [B] to display the odometer.
- Push and hold the left meter button and right meter button [C].




- The service code [A] is displayed on the LCD by the number of two digits.

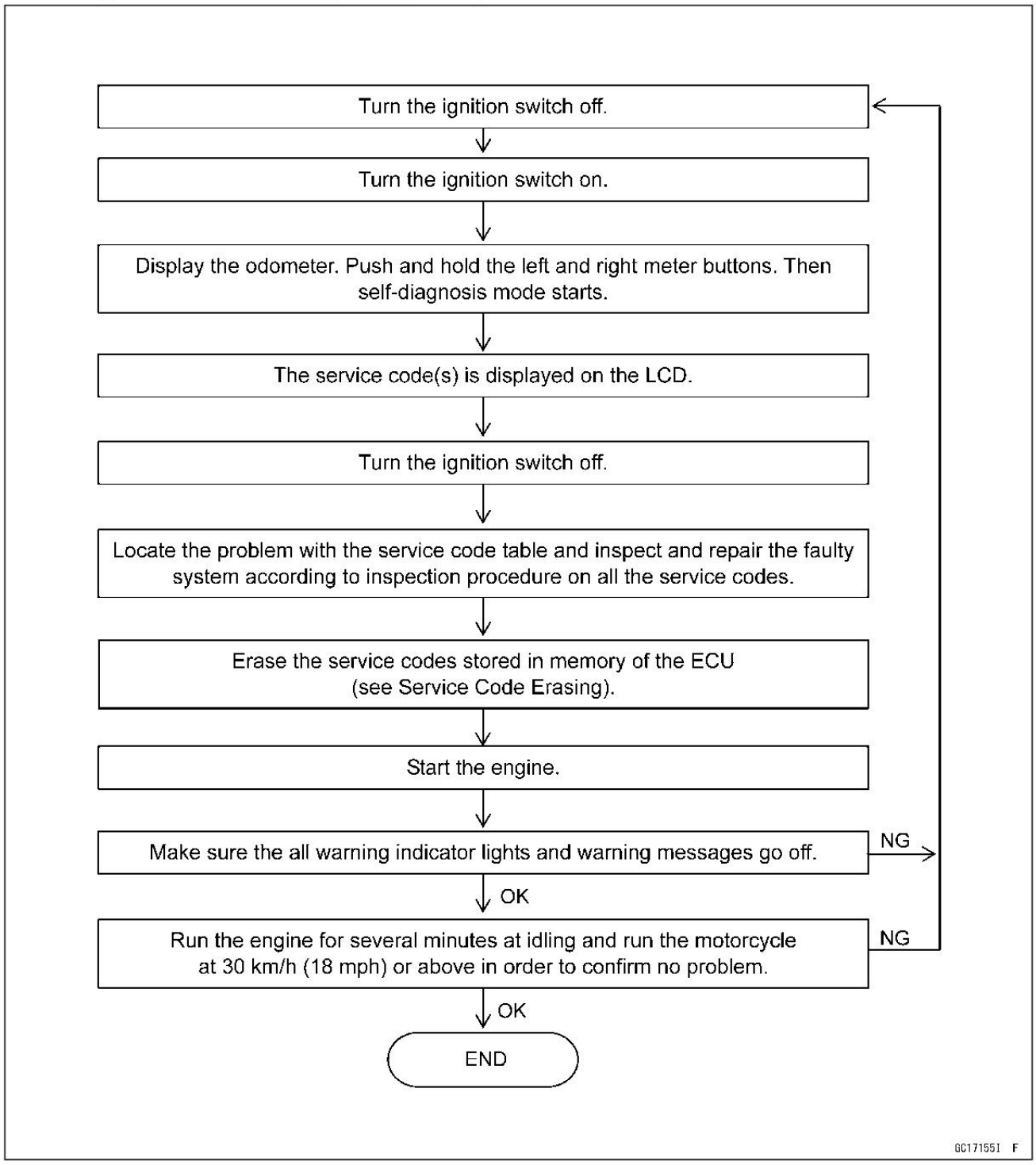
- Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, push and hold the left and right meter buttons.

○When the ignition switch is turned off.

## Self-Diagnosis

### Self-Diagnosis Flow Chart (DFI System)


Turn the ignition switch off.
Turn the ignition switch on.
Display the odometer. Push and hold the left and right meter buttons. Then self-diagnosis mode starts.
The service code(s) is displayed on the LCD.
Turn the ignition switch off.
Locate the problem with the service code table and inspect and repair the faulty system according to inspection procedure on all the service codes.
Erase the service codes stored in memory of the ECU (see Service Code Erasing).
Start the engine.
Make sure the all warning indicator lights and warning messages go off.
NG
OK
Run the engine for several minutes at idling and run the motorcycle at 30 km/h (18 mph) or above in order to confirm no problem.
NG
OK
END
GC17155I F

## Self-Diagnosis

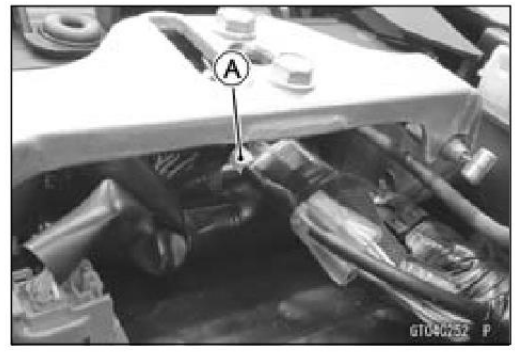
### *Self-diagnosis Procedures (ABS)*

○When a problem occurs with the ABS, the yellow ABS indicator light [A] come on.
○When a problem occurs with KIBS, the warning message appears.

**NOTE**

○*Use a fully charged battery when conducting self-diagnosis. Otherwise, the indicator light blinks very slowly or doesn't blink.*

- Remove the front seat (see Front Seat Removal(15-8)).
- Connect an auxiliary lead to the ABS self-diagnosis terminal [A] for grounding.
- Ground the ABS self-diagnosis terminal to the battery (–) terminal.
- Turn the ignition switch on.
- Count the blinks of the indicator light to read the service code.

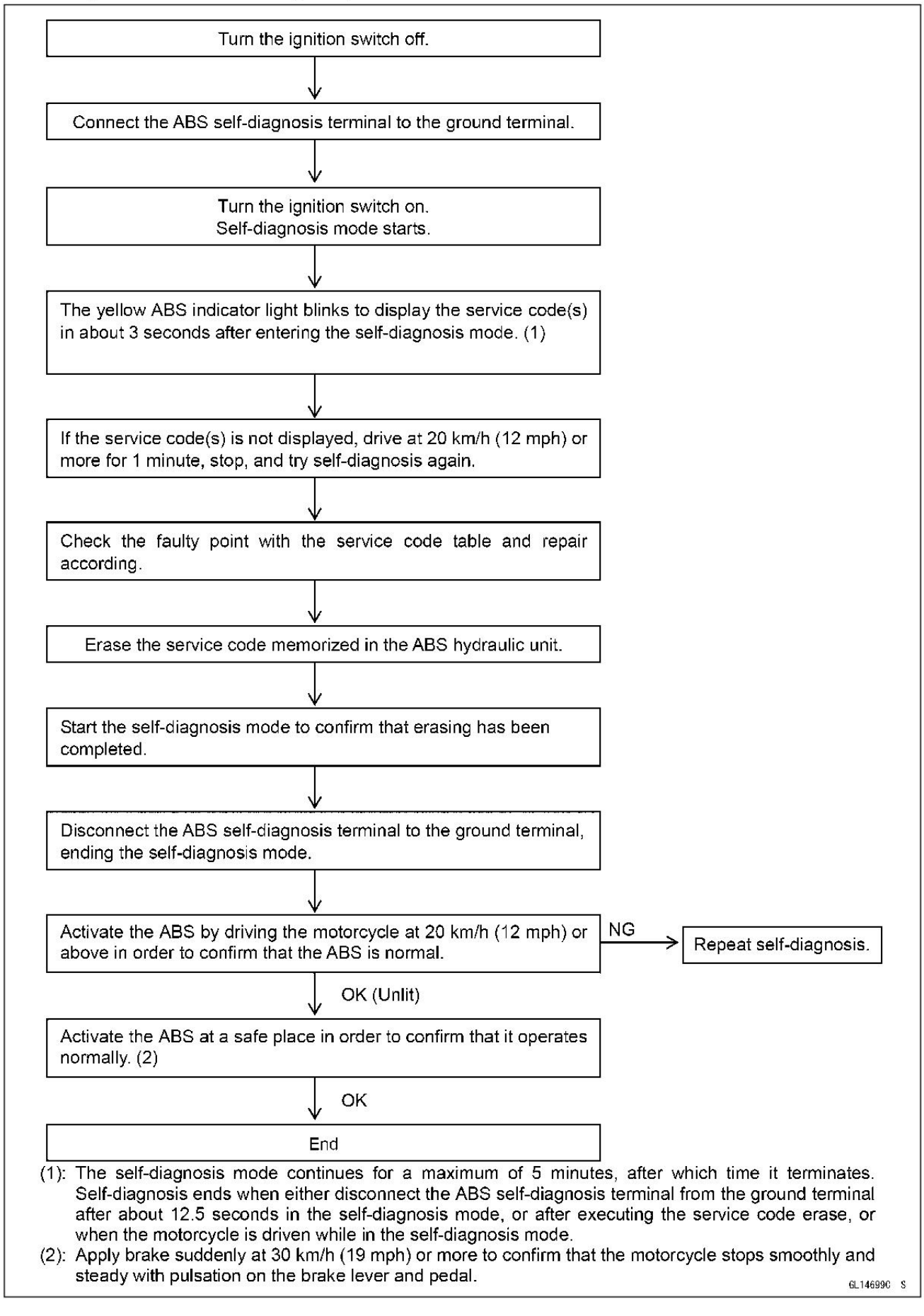



**NOTE**

○*Keep the auxiliary lead ground until you finish reading the service code.*

## Self-Diagnosis

### Self-diagnosis Flow Chart (ABS)


Turn the ignition switch off.
Connect the ABS self-diagnosis terminal to the ground terminal.
Turn the ignition switch on.
Self-diagnosis mode starts.
The yellow ABS indicator light blinks to display the service code(s) in about 3 seconds after entering the self-diagnosis mode. (1)
If the service code(s) is not displayed, drive at 20 km/h (12 mph) or more for 1 minute, stop, and try self-diagnosis again.
Check the faulty point with the service code table and repair according.
Erase the service code memorized in the ABS hydraulic unit.
Start the self-diagnosis mode to confirm that erasing has been completed.
Disconnect the ABS self-diagnosis terminal to the ground terminal, ending the self-diagnosis mode.
Activate the ABS by driving the motorcycle at 20 km/h (12 mph) or above in order to confirm that the ABS is normal.
NG
Repeat self-diagnosis.
OK (Unlit)
Activate the ABS at a safe place in order to confirm that it operates normally. (2)
OK
End

(1): The self-diagnosis mode continues for a maximum of 5 minutes, after which time it terminates. Self-diagnosis ends when either disconnect the ABS self-diagnosis terminal from the ground terminal after about 12.5 seconds in the self-diagnosis mode, or after executing the service code erase, or when the motorcycle is driven while in the self-diagnosis mode.

(2): Apply brake suddenly at 30 km/h (19 mph) or more to confirm that the motorcycle stops smoothly and steady with pulsation on the brake lever and pedal.

GL14699C S

## Self-Diagnosis

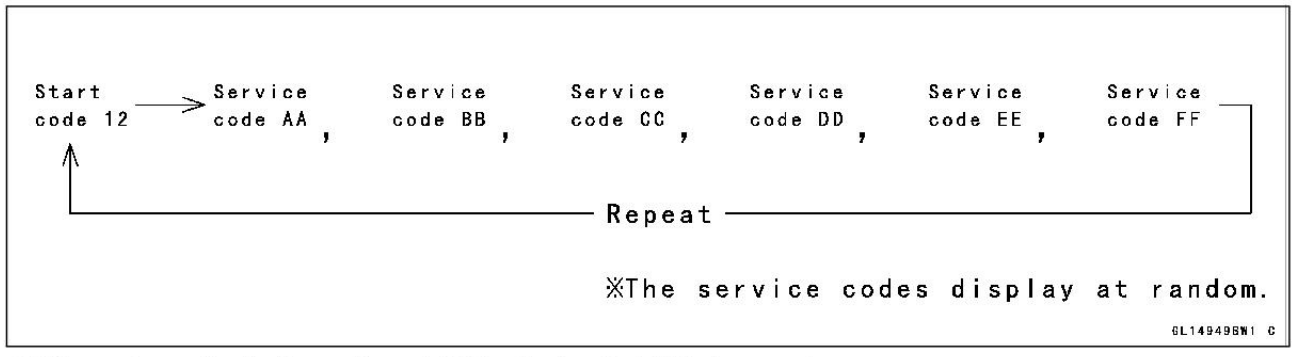
### *Service Code Reading*

**DFI System**

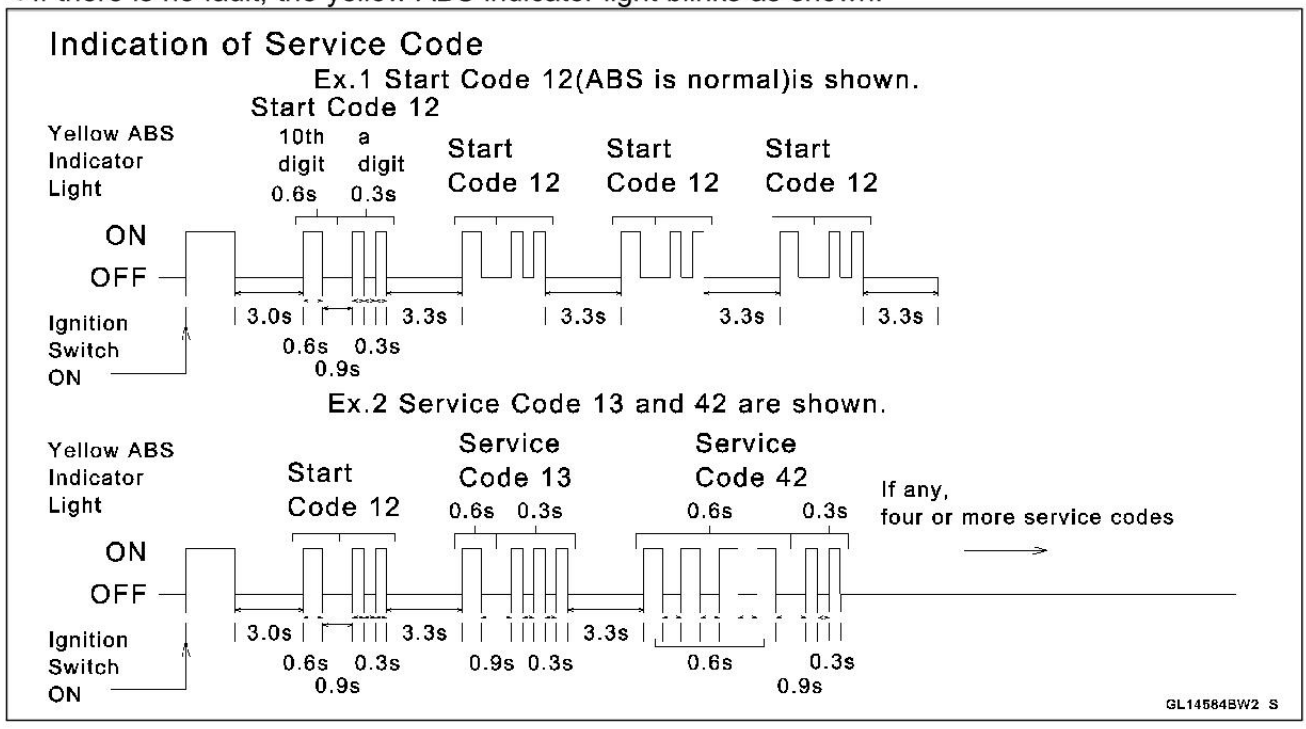
○The service code(s) is displayed on the LCD by the number of two digits.
○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.
○Then after completing all codes, the display is repeated until the ignition switch is turned off or push and hold the left and right meter buttons.
○For example, if three problems occurred in the order of 56, 11, 24, the service codes are displayed from the lowest number in the order listed as shown below.
(11 → 24 → 56) → (11 → 24 → 56) → · · · (repeated)

**ABS**

○Service codes are shown by a series of long and short blinks of the yellow ABS indicator light as shown below.
○Read 10th digit and unit digit as the yellow ABS indicator light blinks.
○When there are a number of faults, a maximum of 6 service codes can be stored and the display will begin starting from the last service code entered.
○For the display pattern, first, the start code 12 is shown, next up to 6 service codes then the display is repeated from the start code once again.




○If there is no fault, the yellow ABS indicator light blinks as shown.



## Self-Diagnosis

### *Service Code Erasing*

**DFI System**

● The service codes stored in memory of the ECU can be erased using Kawasaki Diagnostic System.

**ABS**

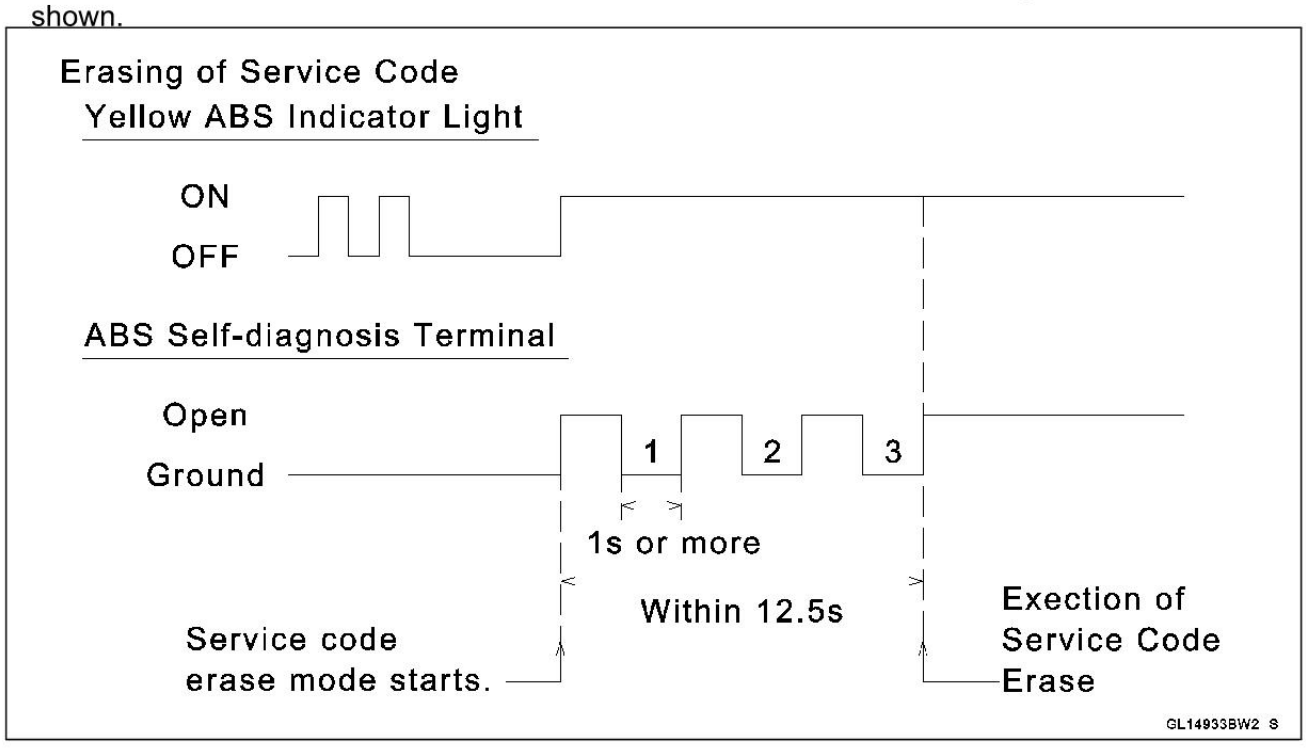
● Start the service code erase mode with the following procedure.

○The erase mode starts when the ABS self-diagnosis terminal is disconnected from the ground after starting the self-diagnosis mode.

○The service code can be erased by grounding and ungrounding (each time for at least one second) the ABS self-diagnosis terminal three times within about 12.5 seconds after starting the erase mode.

○The yellow ABS indicator light remains on during the erase mode.

○Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, only start code 12 will be shown.



## Self-Diagnosis

### *Service Code Table (DFI System)*

○Some service codes appear only on models equipped with a certain system or part.
○DTC: Diagnostic trouble code

| Service Code | DTC | Problems |
|---|---|---|
| 11 | P0120 | Main throttle sensor malfunction, wiring open or short to ground |
| | P0123 | Main throttle sensor malfunction, wiring short to power supply wire |
| 12 | P0105 | Intake air pressure sensor #1 malfunction, wiring open or short to power supply wire |
| | P0106 | Intake air pressure sensor #1 malfunction, the signal is out of the usable range or stuck |
| | P0107 | Intake air pressure sensor #1 malfunction, wiring short to ground |
| 13 | P0110 | Intake air temperature sensor malfunction, wiring open or short to power supply wire |
| | P0111 | Intake air temperature sensor malfunction, the signal is out of the usable range or stuck |
| | P0112 | Intake air temperature sensor malfunction, wiring short to ground |
| 14 | P0115 | Water temperature sensor malfunction, wiring open or short to power supply wire |
| | P0116 | Water temperature sensor malfunction, the signal is out of the usable range or stuck |
| | P0117 | Water temperature sensor malfunction, wiring short to ground |
| 16 | P2226 | Intake air pressure sensor #2 malfunction, wiring open or short to power supply wire |
| | P2227 | Intake air pressure sensor #2 malfunction, plausibility error or stuck |
| | P2228 | Intake air pressure sensor #2 malfunction, wiring short to ground |
| 21 | P0335 | Crankshaft sensor malfunction, wiring open or short |
| 24 | P2158 | Rear wheel rotation sensor malfunction, wiring open or short |
| 25 | P0914 | Gear position switch malfunction, wiring open or short to power supply wire |
| | P0915 | Gear position switch malfunction, the signal is out of the usable range or stuck |
| | P0916 | Gear position switch malfunction, wiring short to ground |
| 27 | P0500 | Front wheel rotation sensor malfunction, wiring open or short |
| 31 | C0064 | Vehicle-down sensor malfunction, wiring short to ground or power supply wire |
| 32 | P0220 | Subthrottle sensor malfunction, wiring open or short to ground |
| | P0223 | Subthrottle sensor malfunction, wiring short to power supply wire |
| 33 | P0130 | Front oxygen sensor malfunction or inactivate, wiring open or short to ground |
| | P0132 | Front oxygen sensor malfunction or inactivate, wiring short to power supply wire |
| | P0133 | Front oxygen sensor malfunction or inactivate, plausibility error |
| | P2A00 | Front oxygen sensor malfunction or inactivate, the signal is out of the usable range |

## Self-Diagnosis

| Service Code | DTC | Problems |
|---|---|---|
| 34 | P048B | Exhaust butterfly valve actuator sensor malfunction, wiring open or short to ground |
| | P048C | Exhaust butterfly valve actuator sensor malfunction, the signal is out of the usable range or stuck |
| | P048E | Exhaust butterfly valve actuator sensor malfunction, wiring short to power supply wire |
| 35 | P1507 | Immobilizer amplifier malfunction |
| 36 | P1508 | Blank key detection |
| 39 | – | ECU communication error |
| 3A | P0443 | Purge valve malfunction, wiring short to ground |
| | P0459 | Purge valve malfunction, wiring short to power supply wire |
| 3E | P0826 | Quick shifter sensor malfunction, wiring open, short to ground or power supply wire |
| 41 | P0201 | Fuel injector #1 malfunction, wiring open or short |
| 42 | P0202 | Fuel injector #2 malfunction, wiring open or short |
| 43 | P0203 | Fuel injector #3 malfunction, wiring open or short |
| 44 | P0204 | Fuel injector #4 malfunction, wiring open or short |
| 4E | P0300 | Multiple cylinders are misfire |
| | P0301 | Cylinder #1 is misfire |
| | P0302 | Cylinder #2 is misfire |
| | P0303 | Cylinder #3 is misfire |
| | P0304 | Cylinder #4 is misfire |
| 4F | P0420 | Catalytic converter efficiency is below threshold |
| 51 | P0351 | Stick coil #1 malfunction, wiring open or short |
| 52 | P0352 | Stick coil #2 malfunction, wiring open or short |
| 53 | P0353 | Stick coil #3 malfunction, wiring open or short |
| 54 | P0354 | Stick coil #4 malfunction, wiring open or short |
| 56 | P0480 | Radiator fan relay malfunction, wiring open or short to ground |
| 5C | P0136 | Rear oxygen sensor malfunction or inactive, wiring open or short to ground |
| | P0138 | Rear oxygen sensor malfunction or inactive, wiring short to power supply wire |
| | P2A01 | Rear oxygen sensor malfunction or inactive, the signal is out of the usable range, plausibility error |
| 5D | P0036 | Rear oxygen sensor heater malfunction, wiring open or short to ground |
| | P0038 | Rear oxygen sensor heater malfunction, wiring short to power supply wire |
| | P0054 | Rear oxygen sensor heater malfunction, plausibility error |
| 62 | P2100 | Subthrottle valve actuator malfunction, wiring open, short to ground or power supply wire |
| 63 | P0475 | Exhaust butterfly valve actuator malfunction, wiring open or short |
| 64 | P0418 | Air switching valve malfunction, wiring short to ground |
| | P2258 | Air switching valve malfunction, wiring short to power supply wire |

## Self-Diagnosis

| Service Code | DTC | Problems |
|---|---|---|
| 67 | P0030 | Front oxygen sensor heater malfunction, wiring open or short to ground |
| | P0032 | Front oxygen sensor heater malfunction, wiring short to power supply wire |
| | P0053 | Front oxygen sensor heater malfunction, plausibility error |
| 6D | P0704 | Starter lockout switch malfunction, the signal is stuck |

**Notes:**

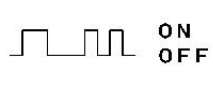
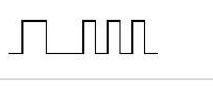
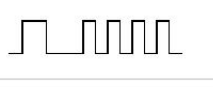
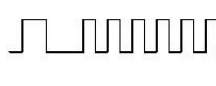
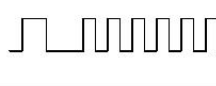
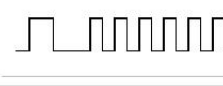
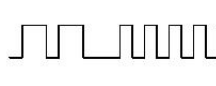
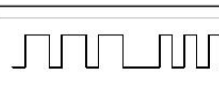
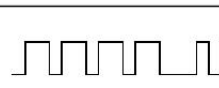
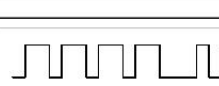
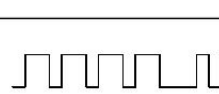
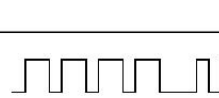
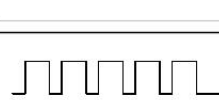
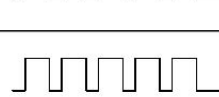
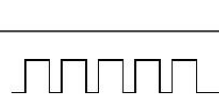
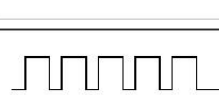
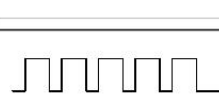
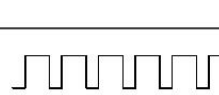
○The ECU may be involved in these problems. If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.

○When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

○DTC (Diagnostic Trouble Code) is displayed on the Kawasaki Diagnostic System and the Generic Scan Tool (GST).

## Self-Diagnosis

### *Service Code Table (ABS)*

| Service Code | Yellow ABS Indicator Light | Problems |
|---|---|---|
| 12 |  | Start code (not fault) |
| 13 |  | Rear intake solenoid valve trouble (shorted or open, stuck valve) |
| 14 |  | Rear outlet solenoid valve trouble (shorted or open, stuck valve) |
| 17 |  | Front intake solenoid valve trouble (shorted or open, stuck valve) |
| 18 |  | Front outlet solenoid valve trouble (shorted or open, stuck valve) |
| 19 |  | ABS solenoid valve relay trouble (wiring shorted or open, stuck relay) |
| 25 |  | Front, rear tire abnormal (substandard tire, deformation wheel, sensor rotor teeth number wrong) |
| 35 |  | ABS motor relay trouble (wiring shorted, open or lock, stuck relay) |
| 42 |  | Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing) |
| 43 |  | Front wheel rotation sensor wiring abnormal (wiring shorted or open) |
| 44 |  | Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing) |
| 45 |  | Rear wheel rotation sensor wiring abnormal (wiring shorted or open) |
| 52 |  | Power supply voltage abnormal (low-voltage) |
| 53 |  | Power supply voltage abnormal (over-voltage) |
| 54 |  | ABS solenoid valve relay supply voltage (low voltage) |
| 55 |  | ECU trouble (ECU operation abnormal) |
| 57 |  | CAN communication (transmission)/CAN bus monitor malfunction |
| 62 |  | ABS hydraulic unit - FI ECU communication error |

## Self-Diagnosis

| Service Code | Yellow ABS Indicator Light | Problems |
|---|---|---|
| 83 | | Output fluid pressure sensor (front brake) trouble (voltage abnormal, wiring shorted or open) |
| 84 | | Output fluid pressure sensor (front brake) trouble (offset abnormal) |
| 89 | | Power supply voltage for fluid pressure sensor abnormal (voltage abnormal, wiring shorted or open) |

## Self-Diagnosis

### *Fail-safe*

○The ECU takes the following measures to prevent damage to the engine.

| Service Codes | Parts or Function | Fail-safe/Symptom Function |
|---|---|---|
| **11** | Main Throttle Sensor | The ECU sets as follows.<br>1. The quantity of fuel to be injected is calculated from engine speed and the intake air pressure.<br>2. The throttle sensor value is set to the default value.<br>3. Deactives the auxiliary controls (KTRC etc.). |
| **12** | Intake Air Pressure Sensor #1 | The ECU sets as follows.<br>1. The quantity of fuel to be injected is determined by engine speed and the throttle opening value.<br>2. The intake air pressure sensor value is set to the default value.<br>3. Deactives the auxiliary controls (KTRC etc.). |
| **13** | Intake Air Temperature Sensor | The ECU sets the intake air temperature to default value. |
| **14** | Water Temperature Sensor | The ECU sets the water temperature to default value. |
| **16** | Intake Air Pressure Sensor #2 | The ECU sets as follows.<br>1. The intake air pressure sensor value is set to the default value.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **21** | Crankshaft Sensor | The engine stops by itself. |
| **24** | Rear Wheel Rotation Sensor | The ECU deactives the auxiliary controls (KTRC etc.). |
| **25** | Gear Position Switch | The ECU sets as follows.<br>1. Sets the gear position to the default value.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **27** | Front Wheel Rotation Sensor | The ECU deactives the auxiliary controls (KTRC etc.). |
| **31** | Vehicle-down Sensor | The ECU shuts off the fuel system. |
| **32** | Subthrottle Sensor | The ECU sets as follows.<br>1. Sets the subthrottle sensor value to the default value.<br>2. Sets the subthrottle valve to the closed position.<br>3. Stops the current to the subthrottle valve actuator.<br>4. Deactives the auxiliary controls (KTRC etc.). |
| **34** | Exhaust Butterfly Valve Actuator Sensor | The ECU sets as follows.<br>1. Sets the exhaust butterfly valve to the full open position.<br>2. Stops the current to the exhaust butterfly valve actuator. |
| **35** | Immobilizer Amplifier (Equipped Models) | The engine does not start. |
| **36** | Ignition Key (Equipped Models) | The engine does not start. |
| **3A** | Purge Valve (Equipped Models) | The ECU stops the current to the purge valve. |

## Self-Diagnosis

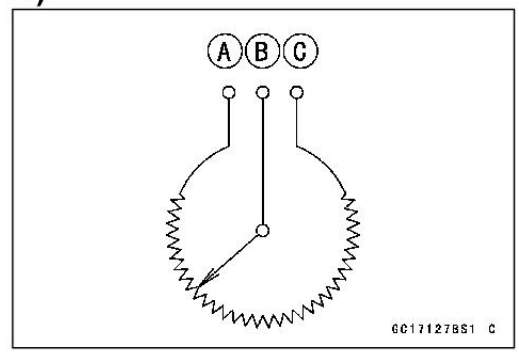
| Service Codes | Parts or Function | Fail-safe/Symptom Function |
|---|---|---|
| **3E** | Quick Shifter Sensor | The ECU deactives the KQS. |
| **41** | Fuel Injector #1 | The ECU deactives the KQS. |
| **42** | Fuel Injector #2 | The ECU deactives the KQS. |
| **43** | Fuel Injector #3 | The ECU deactives the KQS. |
| **44** | Fuel Injector #4 | The ECU deactives the KQS. |
| **51** | Stick Coil #1 | The ECU sets as follows.<br>1. Shuts off the fuel injector #1. The engine keeps running.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **52** | Stick Coil #2 | The ECU sets as follows.<br>1. Shuts off the fuel injector #2. The engine keeps running.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **53** | Stick Coil #3 | The ECU sets as follows.<br>1. Shuts off the fuel injector #3. The engine keeps running.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **54** | Stick Coil #4 | The ECU sets as follows.<br>1. Shuts off the fuel injector #4. The engine keeps running.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **5D** | Rear Oxygen Sensor Heater (Equipped Models) | The ECU stops the current to the rear oxygen sensor heater. |
| **62** | Subthrottle Valve Actuator | The ECU sets as follows.<br>1. Stops the current to the subthrottle valve actuator.<br>2. Deactives the auxiliary controls (KTRC etc.). |
| **63** | Exhaust Butterfly Valve Actuator | The ECU stops the current to the exhaust butterfly valve actuator. |
| **64** | Air Switching Valve | The ECU stops the current to the air switching valve. |
| **67** | Front Oxygen Sensor Heater | The ECU stops the current to the front oxygen sensor heater. |

## Main Throttle Sensor

### Main Throttle Sensor Inspection (Service Code 11)

The main throttle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

Input Terminal [A]: BL
Output Terminal [B]: Y/W
Ground Terminal [C]: G




#### *Main Throttle Sensor Removal/Adjustment*

***NOTICE***

**Do not remove or adjust the main throttle sensor [A] since it has been adjusted and set with precision at the factory.**
**Never drop the throttle body assy especially on a hard surface. Such a shock to the main throttle sensor can damage it.**

#### *DTC P0120*

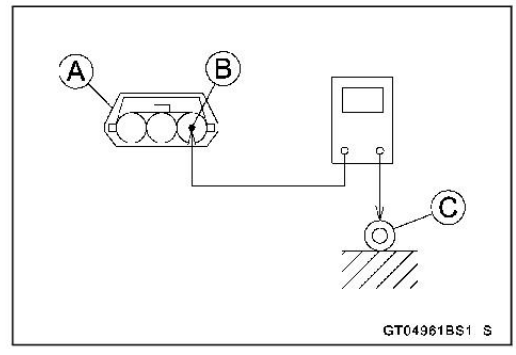
(Checking wire for short circuit to ground)

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Main Throttle Sensor Connector [A]

- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**Y/W lead [B] ←→ Frame Ground Terminal [C]**

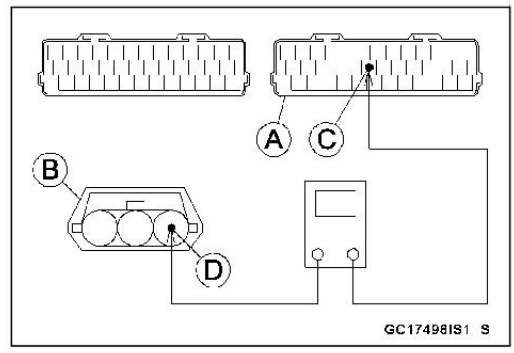
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



## Main Throttle Sensor

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Main Throttle Sensor Connector [B]**
**ECU Terminal 19 [C] ←→ Sensor Terminal [D]**



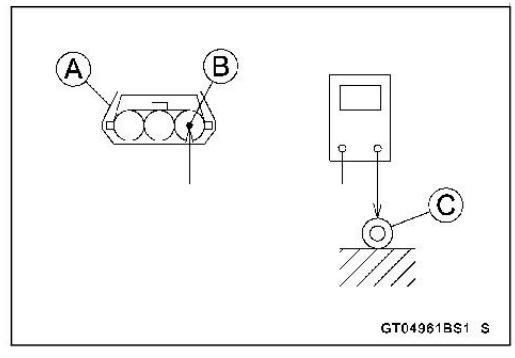

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the main throttle sensor (see Main Throttle Sensor Circuit(17-61)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the throttle body assy and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0123*

(Checking wire for short circuit to power supply wire)
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Main Throttle Sensor Connector [A]

- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → Y/W lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

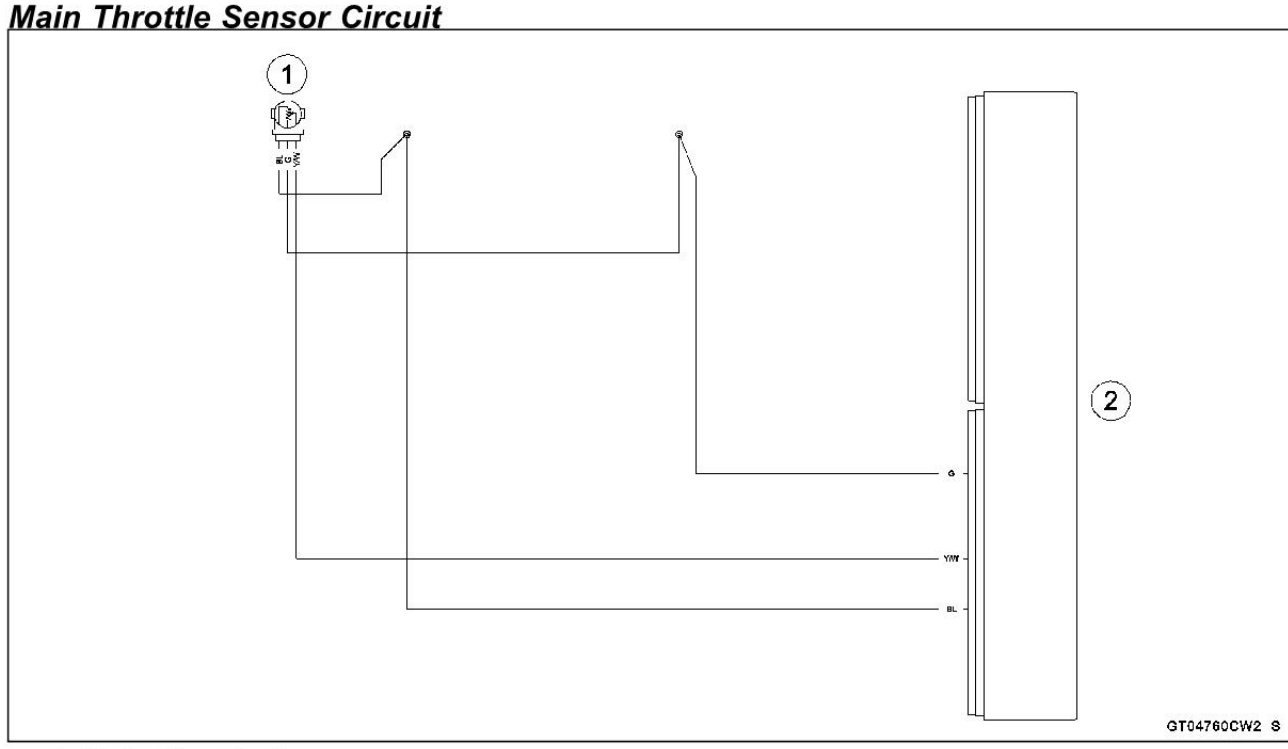



- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the throttle body assy.
★Even if all checks are good, the problem still exists, replace the ECU.

## Main Throttle Sensor

### *Main Throttle Sensor Circuit*



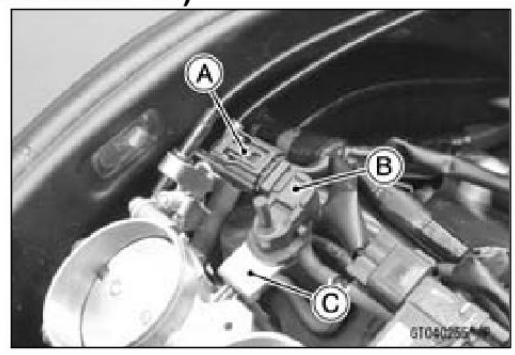

1. Main Throttle Sensor
2. ECU

## Intake Air Pressure Sensor #1

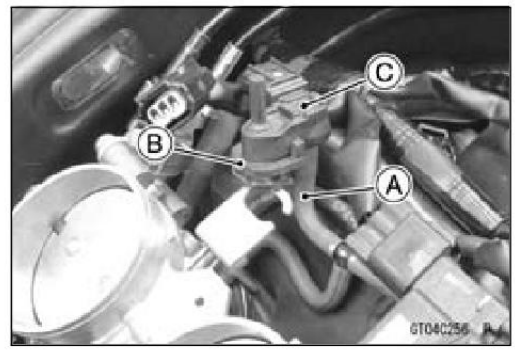
### Intake Air Pressure Sensor #1 Inspection (Service Code 12)

#### *Intake Air Pressure Sensor #1 Removal*

| *NOTICE* |
| --- |
| **Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

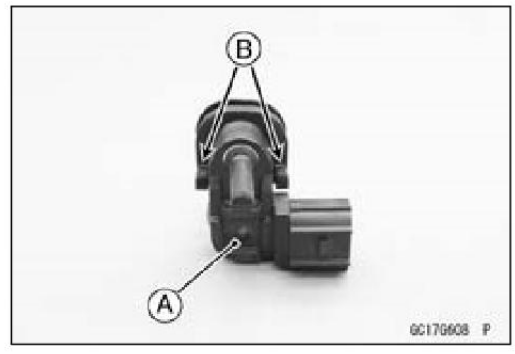



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Intake Air Pressure Sensor #1 Connector [A]
- Remove the intake air pressure sensor #1 [B] from the bracket [C].

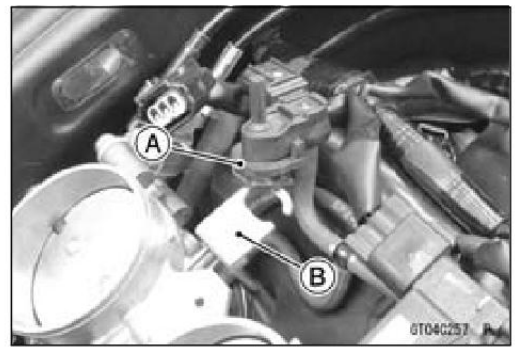



- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #1 [C].

#### *Intake Air Pressure Sensor #1 Installation*




- Installation is the reverse of removal.
- Position the intake air pressure sensor #1 [A] between the projections [B] on the rubber damper.




- Install the rubber damper [A] on the bracket [B].

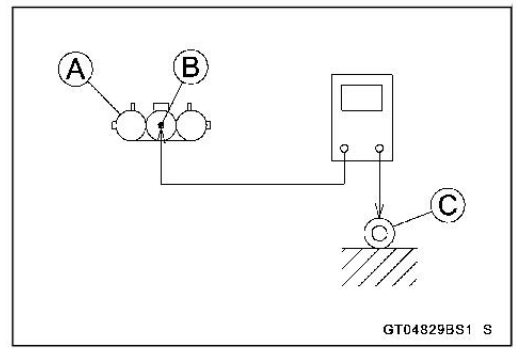
## Intake Air Pressure Sensor #1

### *DTC P0105*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Pressure Sensor #1 Connector (see Intake Air Pressure Sensor #1 Removal(17-62))
- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → Y/BL lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**




- Measure the measuring voltage.
- Turn the ignition switch on.

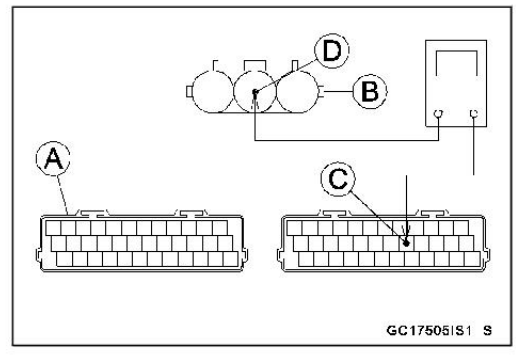
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Intake Air Pressure Sensor Connector [B]**
**ECU Terminal 17 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.

★If there is continuity, first check the other wirings of the intake air pressure sensor #1 (see Intake Air Pressure Sensor #1 Circuit(17-65)).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.

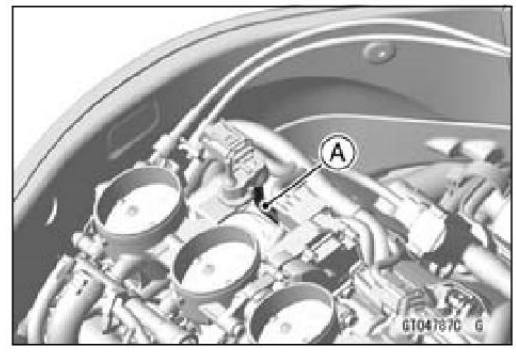
★If the terminals are corroded or bent, replace the intake air pressure sensor #1 and/or ECU.

★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0106*

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Check that the vacuum hoses [A] are securely connected.

★If the vacuum hoses are disconnected, connect the vacuum hoses.



## Intake Air Pressure Sensor #1

★If the vacuum hoses are good, visually inspect the fitting [A] of the intake air pressure sensor #1 and vacuum hoses for clogged.

○Remove:
Intake Air Pressure Sensor #1 (see Intake Air Pressure Sensor #1 Removal(17-62))

★If the sensor and hose are clogged, replace the intake air pressure sensor #1 and/or clean the vacuum hose.

★If the sensor and hose are good, check the terminals of the sensor and ECU for corrosion or bent.

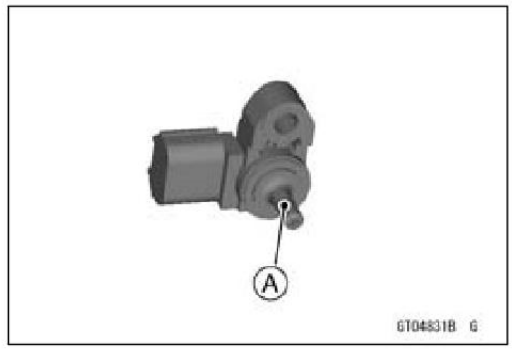
○Remove:
ECU (see ECU Removal(3-12))

★If the terminals are corroded or bent, replace the intake air pressure sensor #1 and/or ECU.

★If the terminals are good, check the intake air pressure sensor #1 wirings (see Intake Air Pressure Sensor #1 Circuit(17-65)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.




### *DTC P0107*

(Checking wire for short circuit to ground)

● Disconnect:
ECU Connectors (see ECU Removal(3-12))
Intake Air Pressure Sensor #1 Connector (see Intake Air Pressure Sensor #1 Removal(17-62))

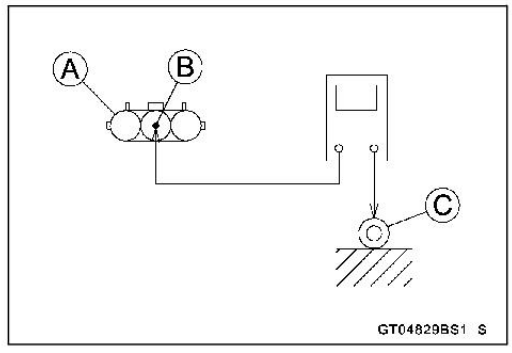
● Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**Y/BL lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.

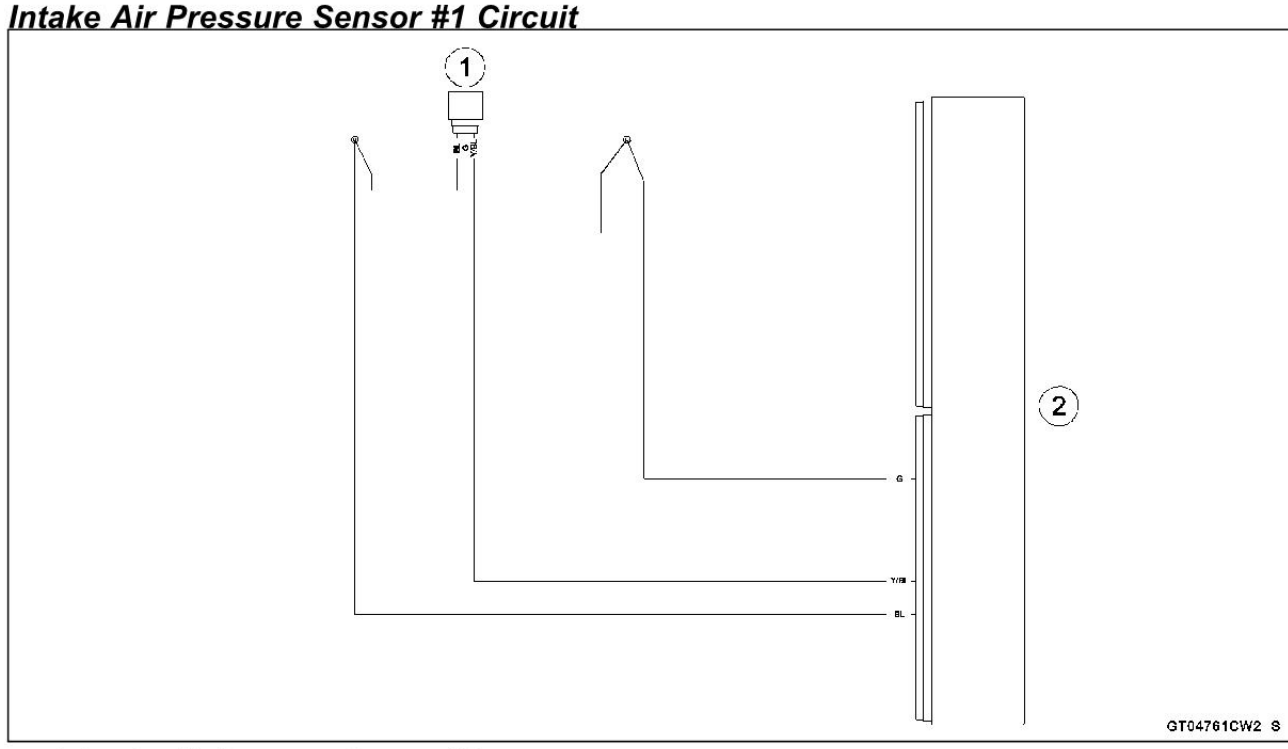
★If there is no continuity, replace the intake air pressure sensor #1.

★Even if all checks are good, the problem still exists, replace the ECU.



## Intake Air Pressure Sensor #1

### *Intake Air Pressure Sensor #1 Circuit*



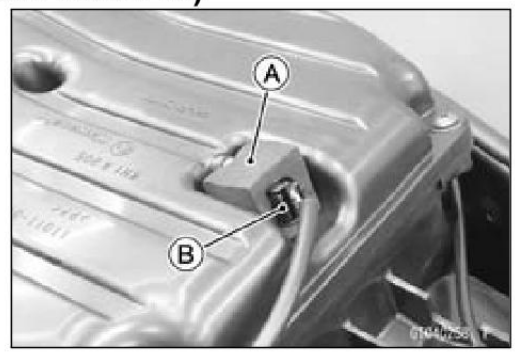

1. Intake Air Pressure Sensor #1
2. ECU

## Intake Air Temperature Sensor

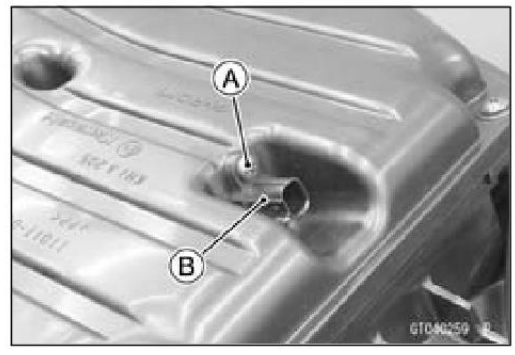
## Intake Air Temperature Sensor Inspection (Service Code 13)

### *Intake Air Temperature Sensor Removal*

| *NOTICE* |
| --- |
| **Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

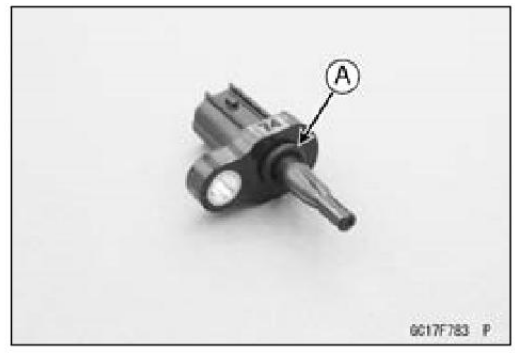



- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Slide the damper [A].
- Disconnect:
  Intake Air Temperature Sensor Connector [B]




- Remove:
  Screw [A]
  Intake Air Temperature Sensor [B]

### *Intake Air Temperature Sensor Installation*




- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.

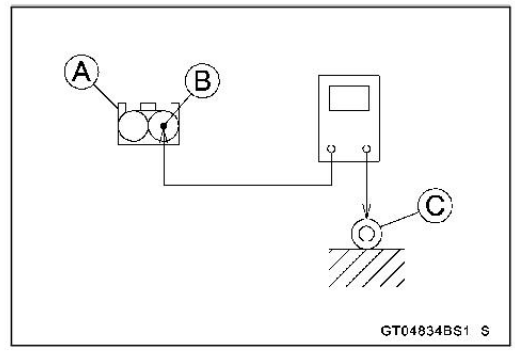
○When installing the sensor which is fastened by screw, tighten the screw after placing the sensor on the bottom surface completely.

- Tighten the screw securely.
- Connect:
  Intake Air Temperature Sensor Connector
- Install the damper.
- Install the removed parts.

### *DTC P0110*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Temperature Sensor Connector (see Intake Air Temperature Sensor Removal(17-66))
- Connect the digital meter to the connector [A].




**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → R/BK lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the measuring voltage.
- Turn the ignition switch on.

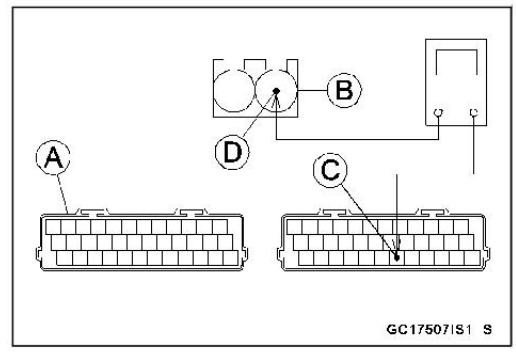
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

## Intake Air Temperature Sensor

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Intake Air Temperature Sensor Connector [B]**
**ECU Terminal 30 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the intake air temperature sensor (see Intake Air Temperature Sensor Circuit(17-68)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the intake air temperature sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0111*
- Remove:
  ECU (see ECU Removal(3-12))
  Intake Air Temperature Sensor (see Intake Air Temperature Sensor Removal(17-66))
- Check the terminals of the sensor and ECU for corrosion or bent.

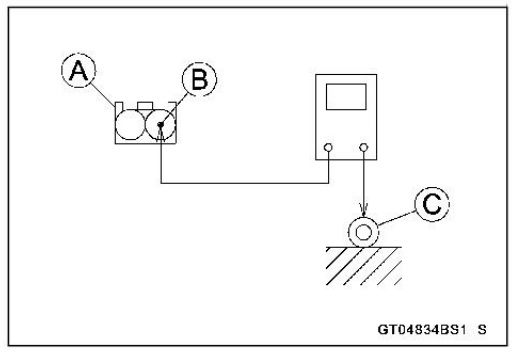
★If the terminals are corroded or bent, replace the intake air temperature sensor and/or ECU.
★If the terminals are good, check the intake air temperature sensor wirings (see Intake Air Temperature Sensor Circuit(17-68)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

## Intake Air Temperature Sensor

### *DTC P0112*

(Checking wire for short circuit to ground)

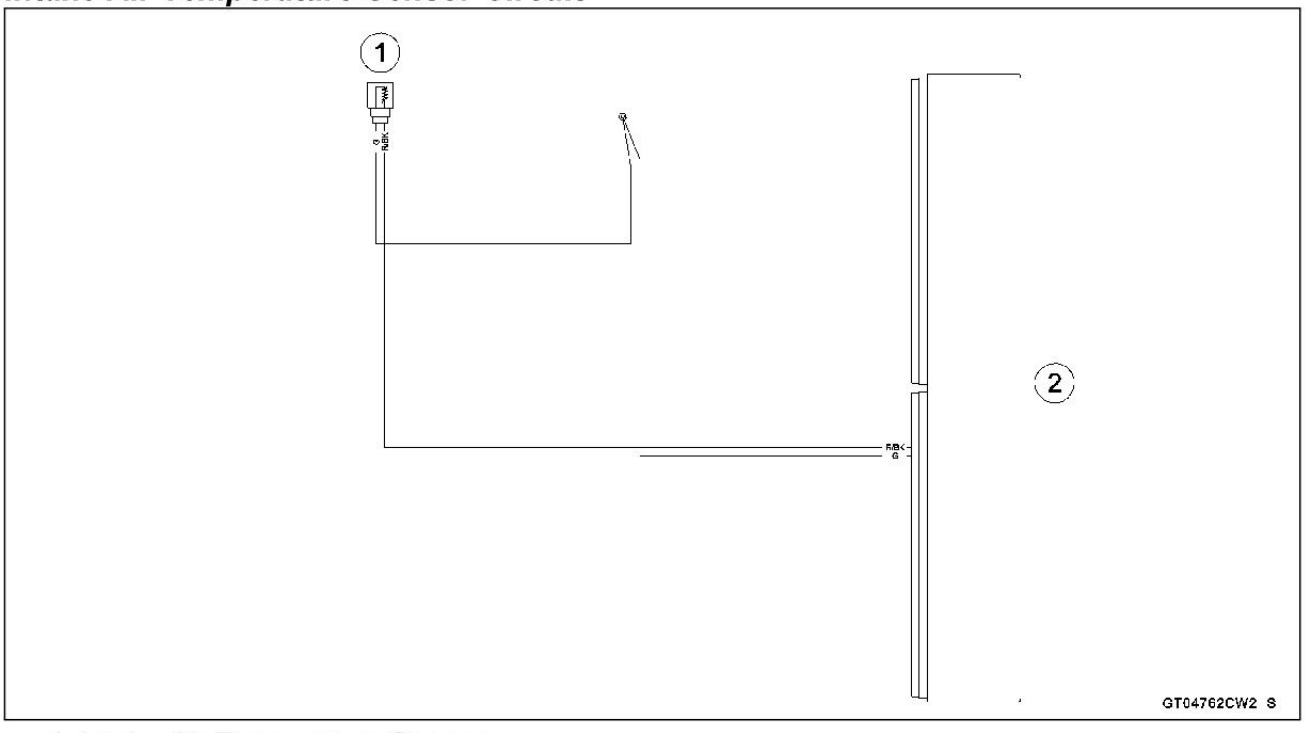
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Intake Air Temperature Sensor Connector (see Intake Air Temperature Sensor Removal(17-66))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.




**Wiring Continuity Inspection**
**R/BK lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the intake air temperature sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Intake Air Temperature Sensor Circuit*

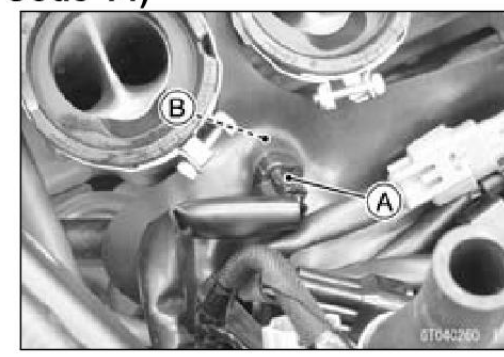



1. Intake Air Temperature Sensor
2. ECU

## Water Temperature Sensor

### Water Temperature Sensor Inspection (Service Code 14)

#### *Water Temperature Sensor Removal*




| *NOTICE* |
| --- |
| **Never drop the water temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

- Drain the coolant (see Coolant Change(2-27)).
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-28))
- Disconnect:
  Water Temperature Sensor Connector [A]
- Remove:
  Water Temperature Sensor [B] with O-ring

#### *Water Temperature Sensor Installation*

- Replace the O-ring with a new one.

**NOTE**

○*Do not to apply grease to the O-ring.*

- Tighten:

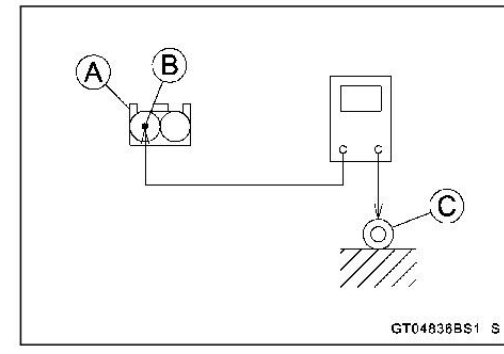
**Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)**

- Connect:
  Water Temperature Sensor Connector
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change(2-27)).
- Install the removed parts.

#### *DTC P0115*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-69))
- Connect the digital meter to the connector [A].




**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → W lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the measuring voltage.
- Turn the ignition switch on.

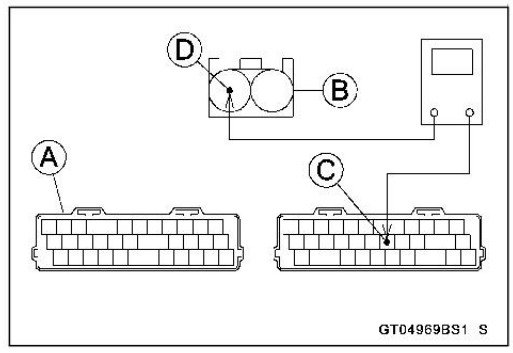
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

## Water Temperature Sensor

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Water Temperature Sensor Connector [B]**
**ECU Terminal 18 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the water temperature sensor (see Water Temperature Sensor Circuit(17-71)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the water temperature sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0116*
- Remove:
  ECU (see ECU Removal(3-12))
  Water Temperature Sensor (see Water Temperature Sensor Removal(17-69))
- Check the terminals of the sensor and ECU for corrosion or bent.

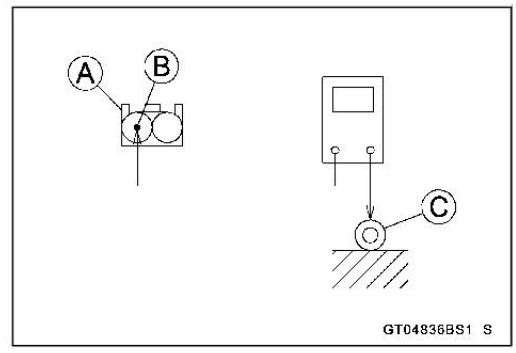
★If the terminals are corroded or bent, replace the water temperature sensor and/or ECU.
★If the terminals are good, check the water temperature sensor wirings (see Water Temperature Sensor Circuit(17-71)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

## Water Temperature Sensor

### *DTC P0117*

(Checking wire for short circuit to ground)

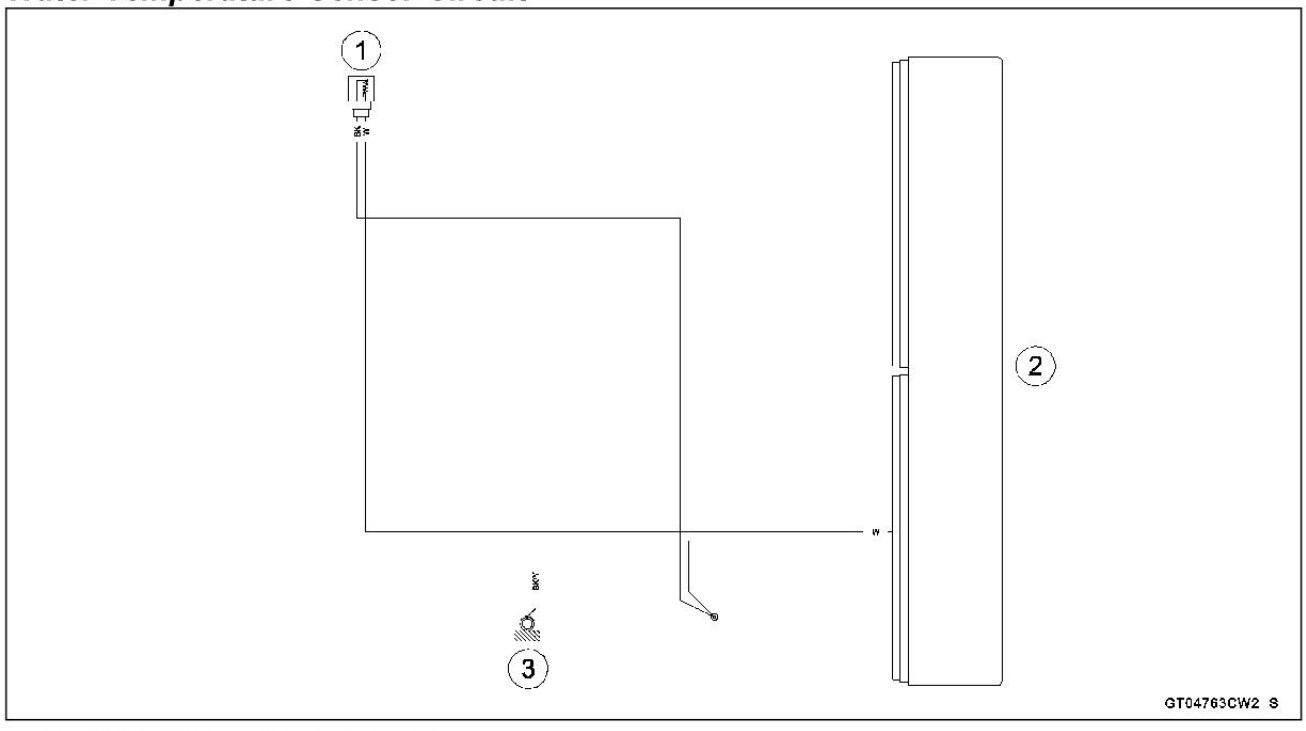
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-69))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.




**Wiring Continuity Inspection**
**W lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the water temperature sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Water Temperature Sensor Circuit*



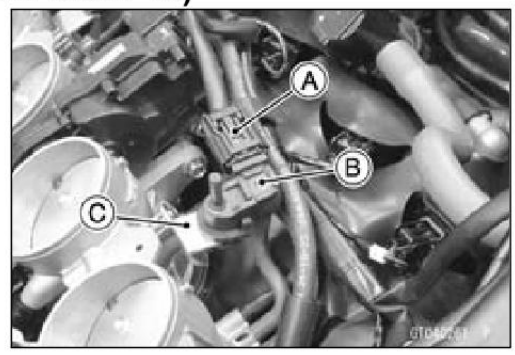

1. Water Temperature Sensor
2. ECU
3. Frame Ground

## Intake Air Pressure Sensor #2

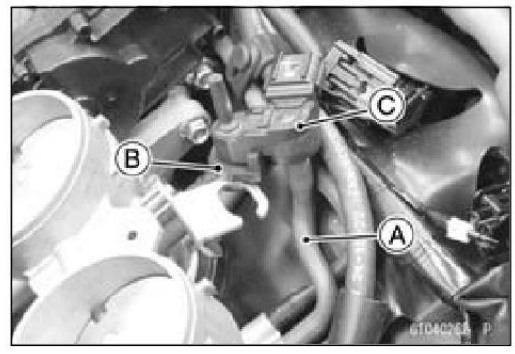
### Intake Air Pressure Sensor #2 Inspection (Service Code 16)

#### *Intake Air Pressure Sensor #2 Removal*

| *NOTICE* |
| --- |
| **Never drop the intake air pressure sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

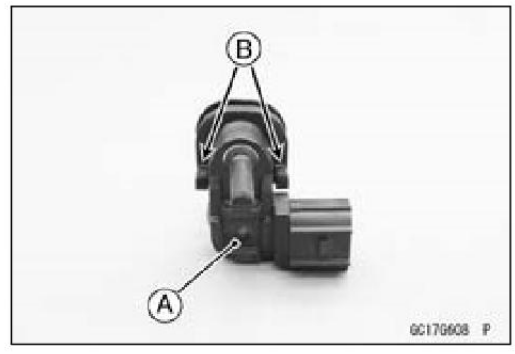



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Intake Air Pressure Sensor #2 Connector [A]
- Remove the intake air pressure sensor #2 [B] from the bracket [C].

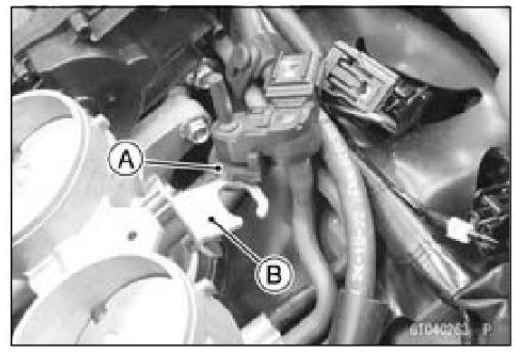



- Disconnect the vacuum hose [A].
- Remove the rubber damper [B] from the intake air pressure sensor #2 [C].

#### *Intake Air Pressure Sensor #2 Installation*




- Installation is the reverse of removal.
- Position the intake air pressure sensor #2 [A] between the projections [B] on the rubber damper.




- Install the rubber damper [A] on the bracket [B].

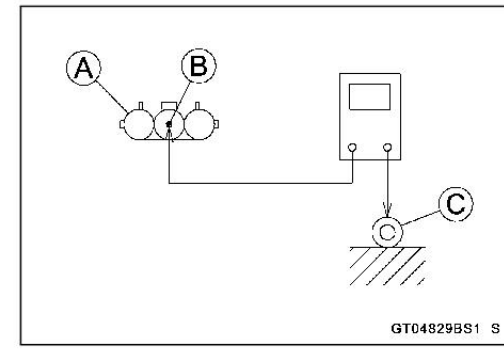
## Intake Air Pressure Sensor #2

### *DTC P2226*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Pressure Sensor #2 Connector (see Intake Air Pressure Sensor #2 Removal(17-72))
- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → G/W lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**




- Measure the measuring voltage.
- Turn the ignition switch on.

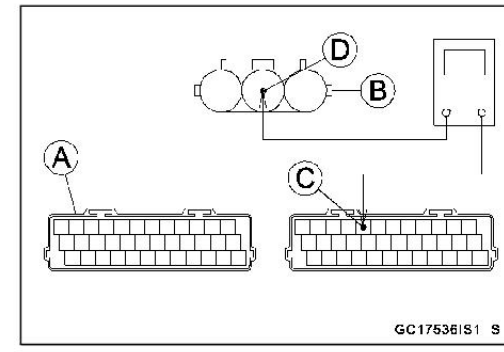
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Intake Air Pressure Sensor Connector [B]**
**ECU Terminal 8 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.

★If there is continuity, first check the other wirings of the intake air pressure sensor #2 (see Intake Air Pressure Sensor #2 Circuit(17-75)).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.

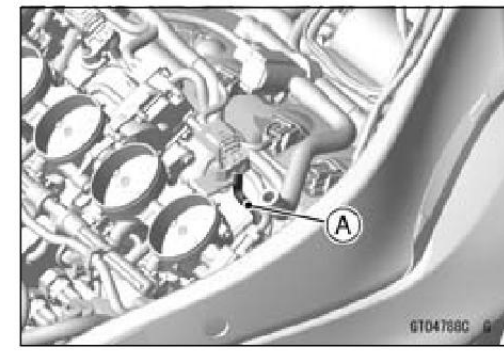
★If the terminals are corroded or bent, replace the intake air pressure sensor #2 and/or ECU.

★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P2227*

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Check that the vacuum hose [A] is securely connected.

★If the vacuum hose is disconnected, connect the vacuum hose.



## Intake Air Pressure Sensor #2

★If the vacuum hose is good, visually inspect the fitting [A] of the intake air pressure sensor #2 and vacuum hose for clogged.

○Remove:
Intake Air Pressure Sensor #2 (see Intake Air Pressure Sensor #2 Removal(17-72))

★If the sensor and hose are clogged, replace the intake air pressure sensor #2 and/or clean the vacuum hose.

★If the sensor and hose are good, check the terminals of the sensor and ECU for corrosion or bent.

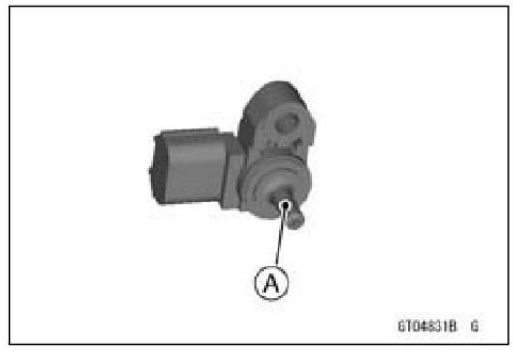
○Remove:
ECU (see ECU Removal(3-12))

★If the terminals are corroded or bent, replace the intake air pressure sensor #2 and/or ECU.

★If the terminals are good, check the intake air pressure sensor #2 wirings (see Intake Air Pressure Sensor #2 Circuit(17-75)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.




### *DTC P2228*

(Checking wire for short circuit to ground)

● Disconnect:
ECU Connectors (see ECU Removal(3-12))
Intake Air Pressure Sensor #2 Connector (see Intake Air Pressure Sensor #2 Removal(17-72))

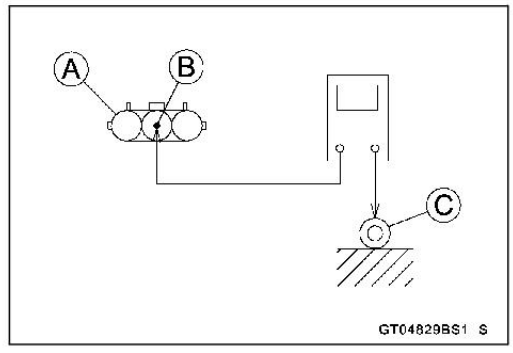
● Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**G/W lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.

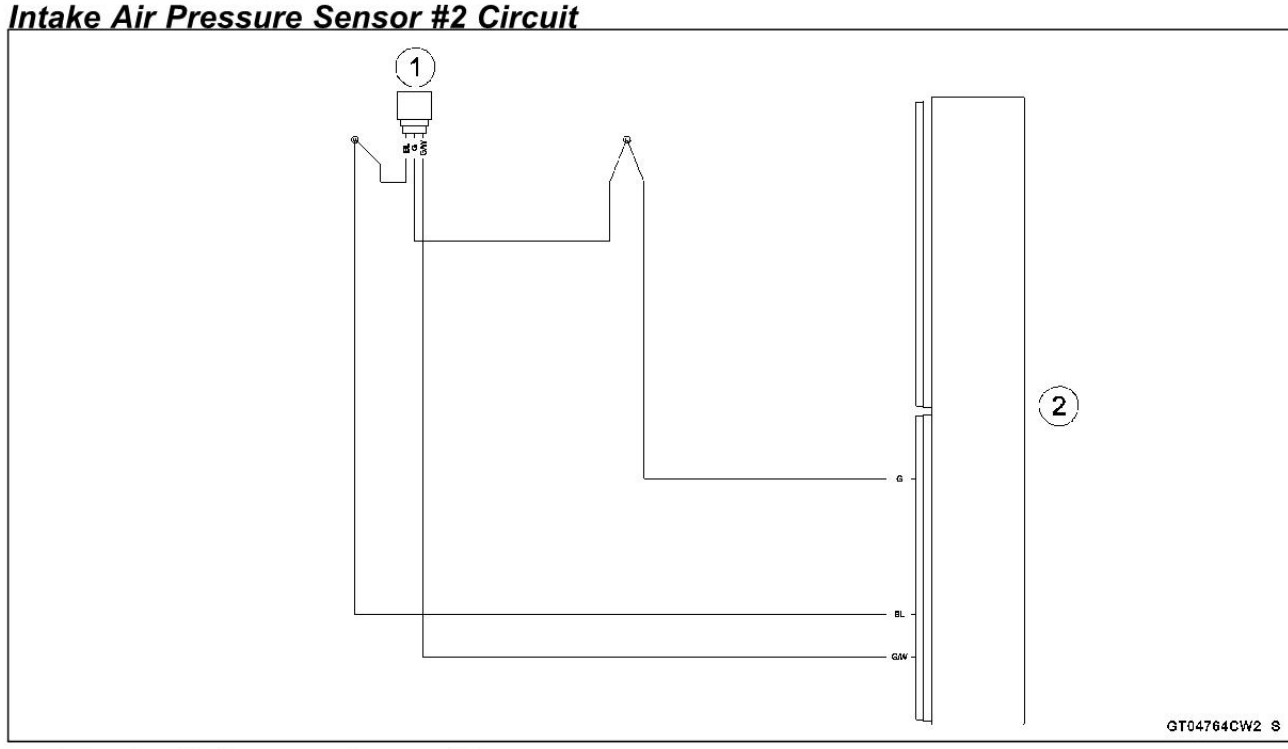
★If there is no continuity, replace the intake air pressure sensor #2.

★Even if all checks are good, the problem still exists, replace the ECU.



## Intake Air Pressure Sensor #2

### *Intake Air Pressure Sensor #2 Circuit*




1. Intake Air Pressure Sensor #2
2. ECU

## Crankshaft Sensor

## Crankshaft Sensor Inspection (Service Code 21)

### *Crankshaft Sensor Removal*

● Refer to the Crankshaft Sensor Removal (see Crankshaft Sensor Removal(16-39)).

### *Crankshaft Sensor Installation*

● Refer to the Crankshaft Sensor Installation (see Crankshaft Sensor Installation(16-39)).

### *DTC P0335*

● Refer to the Crankshaft Sensor Peak Voltage Inspection (see Crankshaft Sensor Peak Voltage Inspection(16-40)).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and sensor connectors.

**Wiring Continuity Inspection**

**ECU Connector [A] ←→**

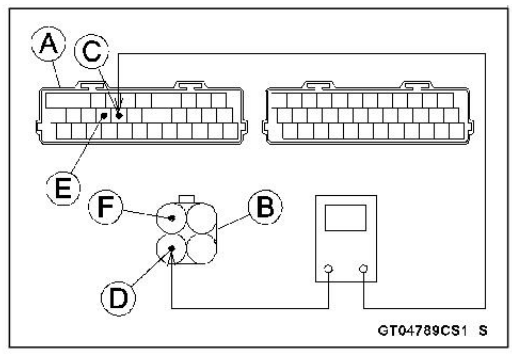
**Crankshaft Sensor Connector [B]**

**ECU Terminal 56 [C] ←→ Sensor Terminal [D]**

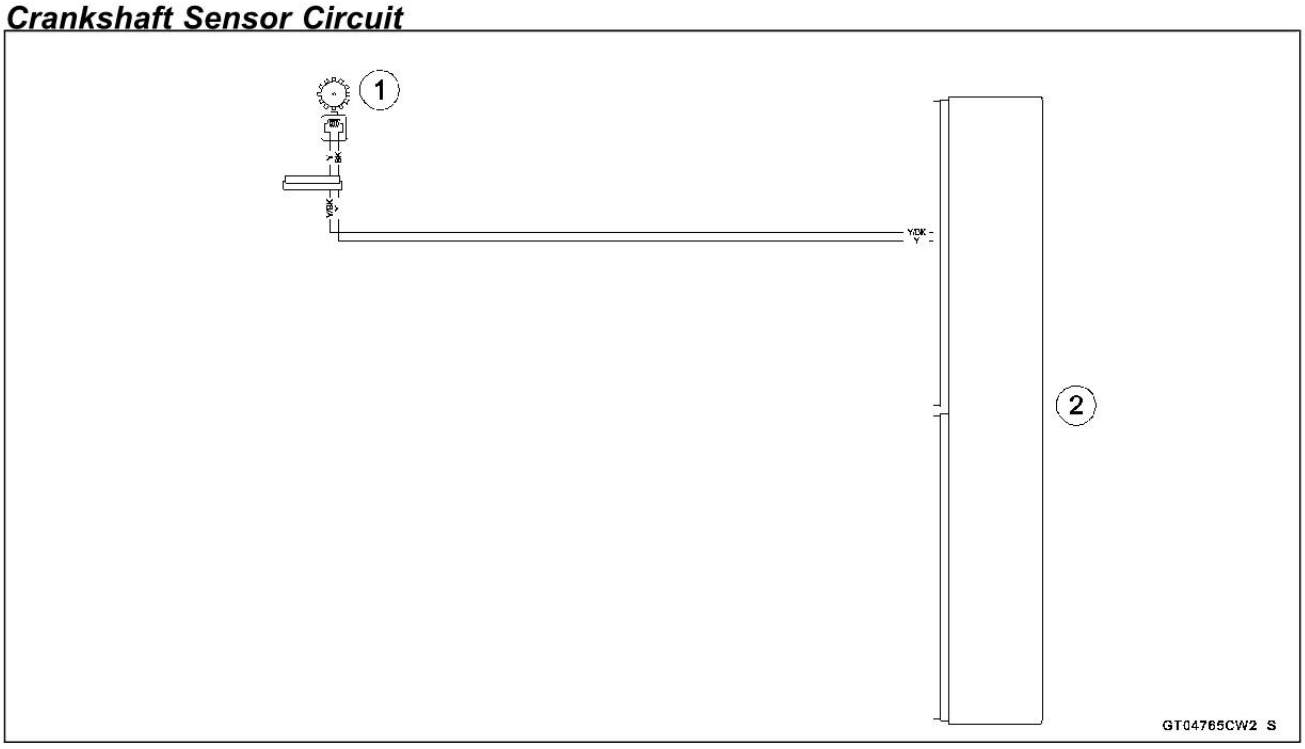
**ECU Terminal 57 [E] ←→ Sensor Terminal [F]**

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.




### *Crankshaft Sensor Circuit*




1. Crankshaft Sensor
2. ECU

## Rear Wheel Rotation Sensor

### Rear Wheel Rotation Sensor Inspection (Service Code 24)

The rear wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU.

The ECU uses the rear wheel rotation sensor signal for motorcycle speed. The service code 24 is detected with the ECU.

#### *Rear Wheel Rotation Sensor Removal*

- Refer to the Rear Wheel Rotation Sensor Removal (see Rear Wheel Rotation Sensor Removal(12-33)).

#### *Rear Wheel Rotation Sensor Installation*

- Refer to the Rear Wheel Rotation Sensor Installation (see Rear Wheel Rotation Sensor Installation(12-34)).

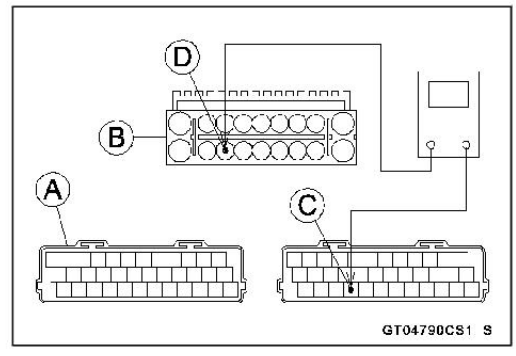
#### *DTC P2158*

- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection(12-35)).

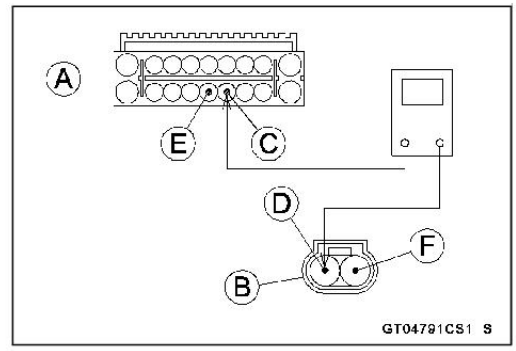
- When service code 24 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal(12-33))
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-30))

- For ABS equipped models, check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**ABS Hydraulic Unit Connector [B]**
**ECU Terminal 33 [C] ←→ ABS Hydraulic Unit Terminal 16 [D]**



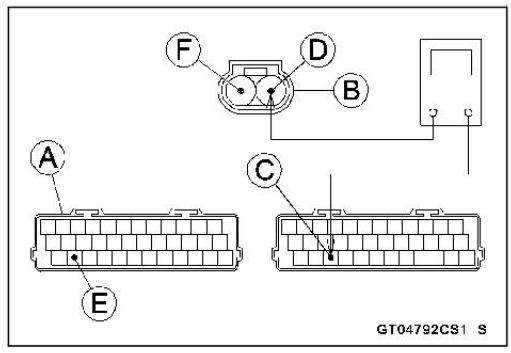

**Wiring Continuity Inspection**
**ABS Hydraulic Unit Connector [A] ←→**
**Rear Wheel Rotation Sensor Connector [B]**
**ABS Hydraulic Unit Connector Terminal 13 [C] ←→ Sensor Terminal [D]**
**ABS Hydraulic Unit Connector Terminal 14 [E] ←→ Sensor Terminal [F]**



## Rear Wheel Rotation Sensor

- For other than ABS equipped models, check the wiring for continuity between harness connectors.

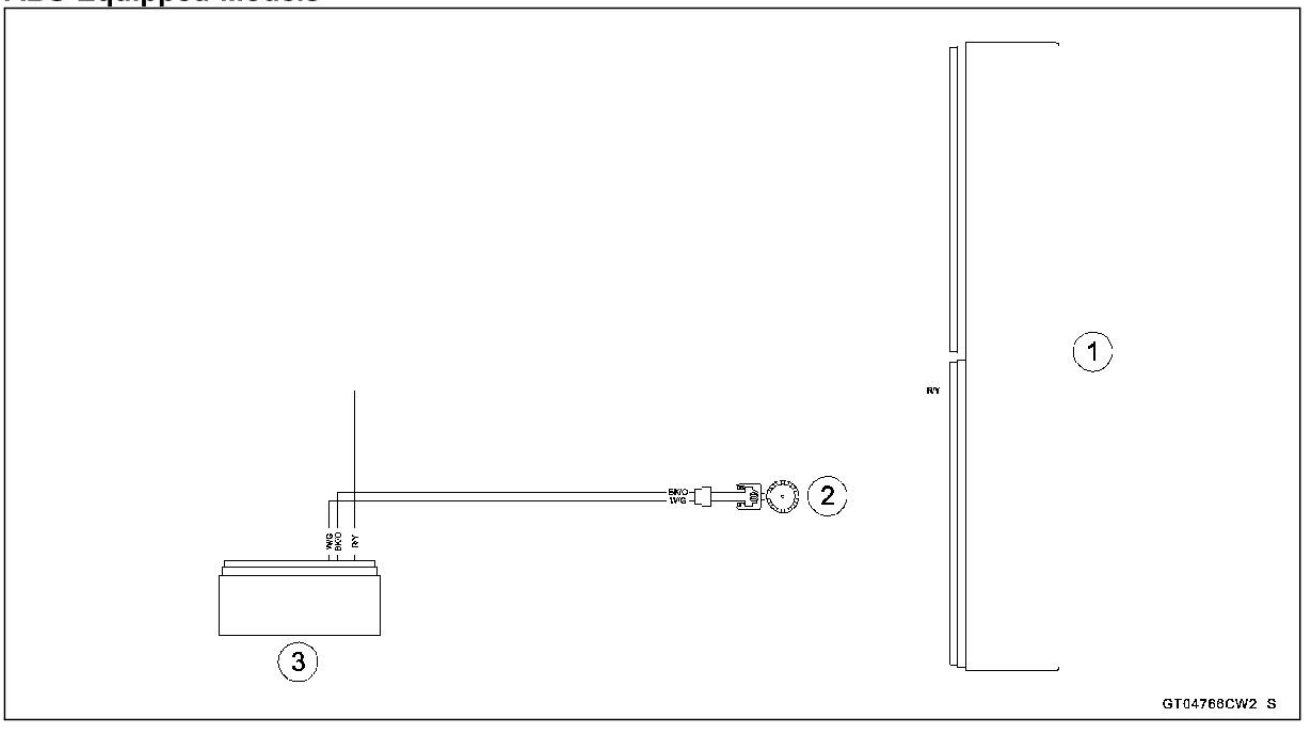
**Wiring Continuity Inspection**
**ECU Connector [A] ← →**
**Rear Wheel Rotation Sensor Connector [B]**
**ECU Terminal 34 [C] ←→ Sensor Terminal [D]**
**ECU Terminal 71 [E] ←→ Sensor Terminal [F]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the rear wheel rotation sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Rear Wheel Rotation Sensor Circuit*

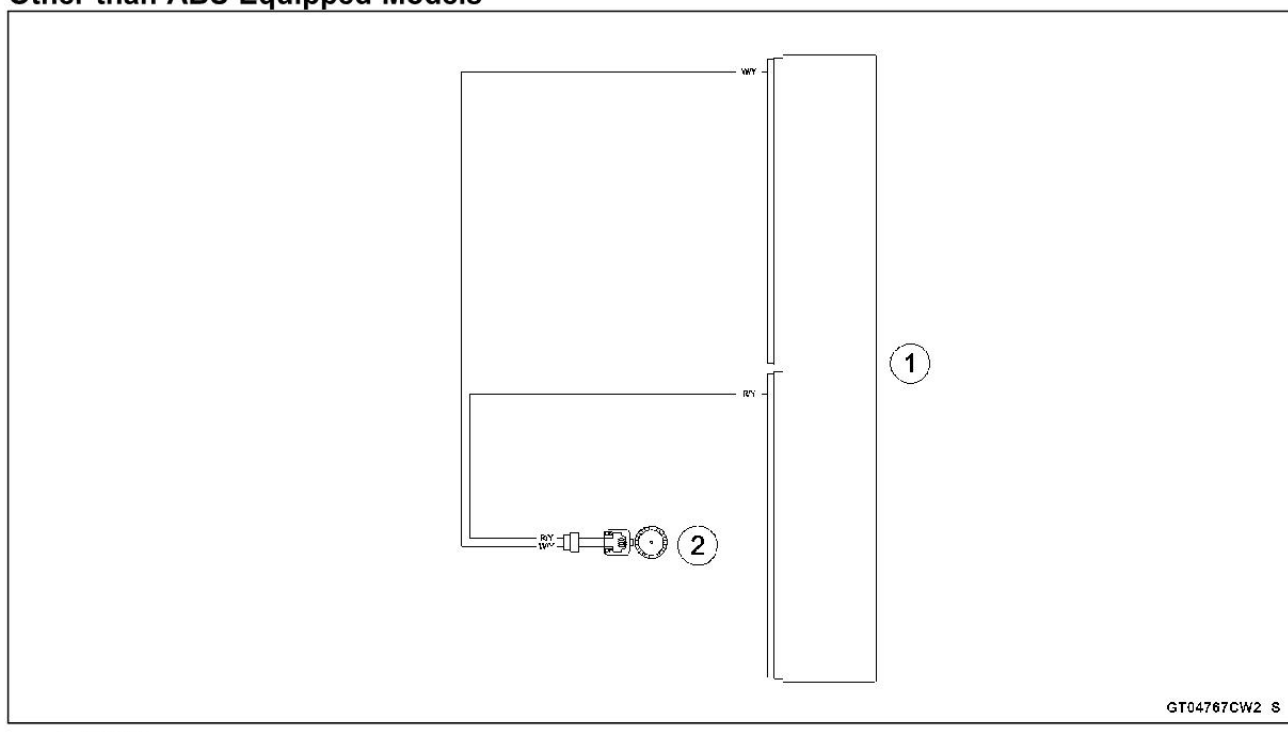
**ABS Equipped Models**




1. ECU
2. Rear Wheel Rotation Sensor
3. ABS Hydraulic Unit

## Rear Wheel Rotation Sensor

### Other than ABS Equipped Models



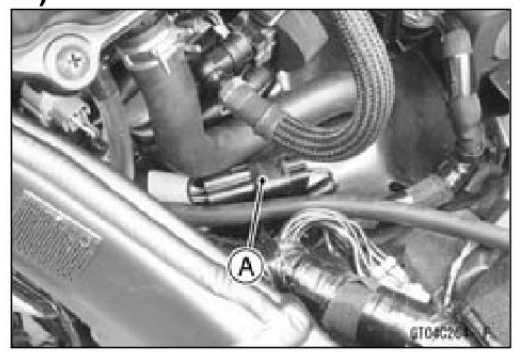

1. ECU
2. Rear Wheel Rotation Sensor

## Gear Position Switch

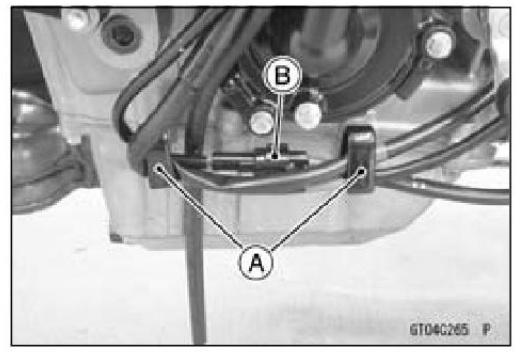
### Gear Position Switch Inspection (Service Code 25)

#### *Gear Position Switch Removal*

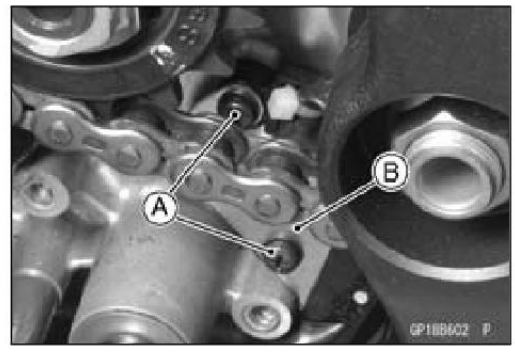
- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal(11-12))
  Left Lower Fairing (see Lower Fairing Removal(15-9))
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Gear Position Switch Connector [A]




- Open the clamps [A].
- Disconnect:
  Side Stand Switch Connector [B]



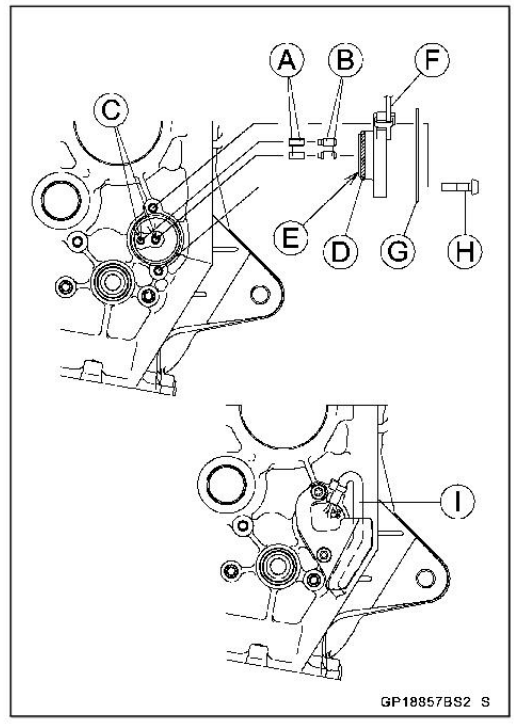

- Remove:
  Gear Position Switch Screws [A]
  Holding Plate [B]
  Gear Position Switch




- Remove the pins [A] and springs from the shift drum.

## Gear Position Switch

### *Gear Position Switch Installation*




- Securely place the springs [A] and pins [B] into the holes [C] of the shift drum.
- Replace the new O-ring [D] with a new one, and apply grease to it.
- Apply electrical contact grease to the gear position switch terminals [E].
- Install the gear position switch [F] and holding plate [G].

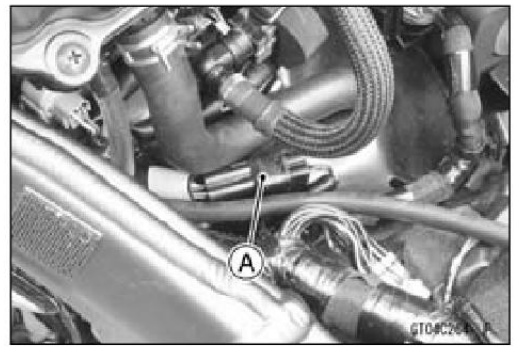
○When installing the switch which is fastened by screws, tighten the screws after placing the switch on the bottom surface completely.

- Replace the gear position switch screws [H] with new ones, and tighten them.
- Run the gear position switch lead [I] correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

### *DTC P0914*

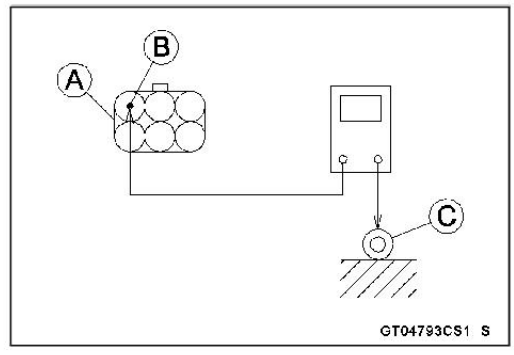
(Checking wire for short circuit to power supply wire)

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Gear Position Switch Connector [A]




- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to switch connector:**
**Digital Meter (+) → G/R lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**




- Measure the measuring voltage.
- Turn the ignition switch on.

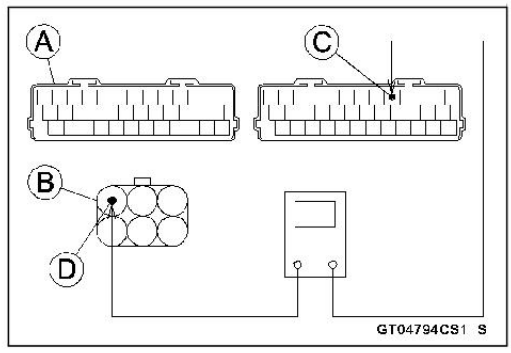
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

## Gear Position Switch

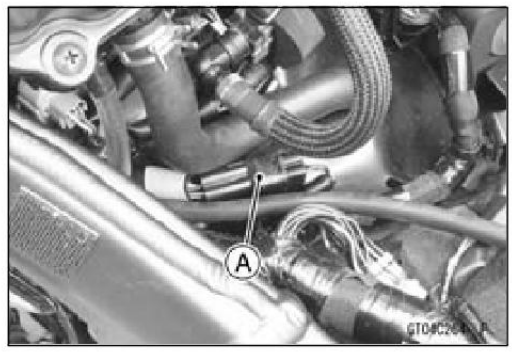
(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Gear Position Switch Connector [B]**
**ECU Terminal 4 [C] ←→ Sensor Terminal [D]**



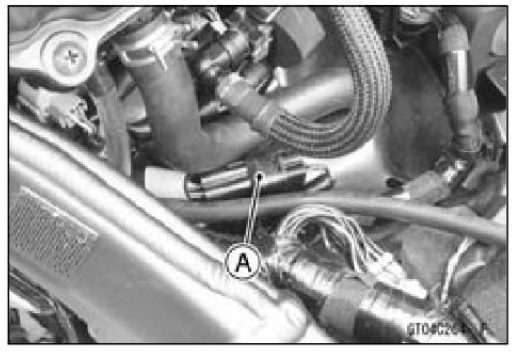

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the gear position switch (see Gear Position Switch Circuit(17-83)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the switch and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the gear position switch and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0915*
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Gear Position Switch Connector [A]
  ECU Connectors (see ECU Removal(3-12))
- Check the terminals of the switch and ECU for corrosion or bent.




★If the terminals are corroded or bent, replace the gear position switch and/or ECU.
★If the terminals are good, check the gear position switch wirings (see Gear Position Switch Circuit(17-83)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0916*
(Checking wire for short circuit to ground)
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Gear Position Switch Connector [A]
  ECU Connectors (see ECU Removal(3-12))

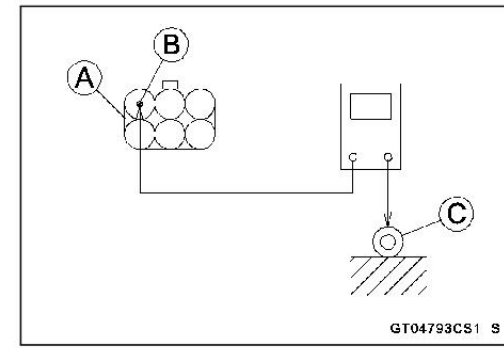


## Gear Position Switch

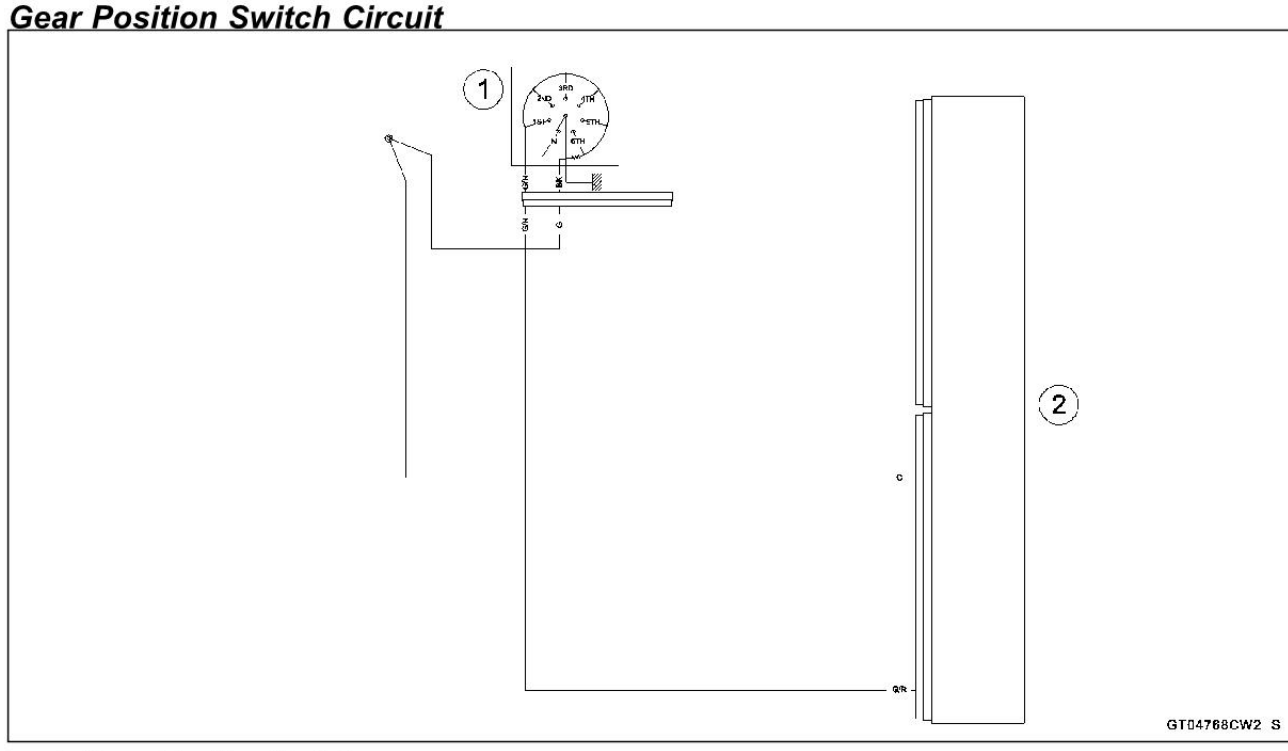
● Check the wiring for short circuit to ground by checking continuity between the switch connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**G/R lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the gear position switch.
★Even if all checks are good, the problem still exists, replace the ECU.




### *Gear Position Switch Circuit*




1. Gear Position Switch
2. ECU

## Front Wheel Rotation Sensor

### Front Wheel Rotation Sensor Inspection (Service Code 27)

The front wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit (ABS equipped models). For other than ABS equipped models, the signal is sent directly to the ECU. The service code 27 is detected with the ECU.

#### *Front Wheel Rotation Sensor Removal*

- Refer to the Front Wheel Rotation Sensor Removal (see Front Wheel Rotation Sensor Removal(12-32)).

#### *Front Wheel Rotation Sensor Installation*

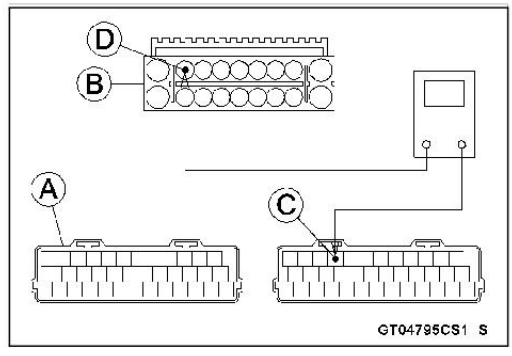
- Refer to the Front Wheel Rotation Sensor Installation (see Front Wheel Rotation Sensor Installation(12-33)).

#### *DTC P0500*

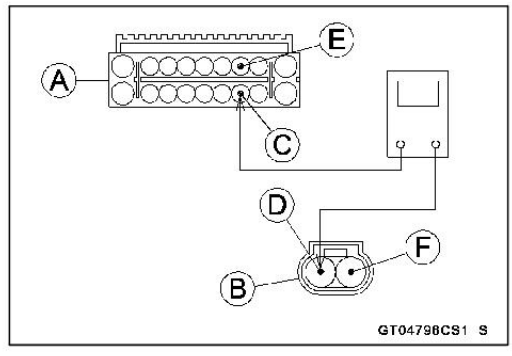
- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection(12-35)).
- When service code 27 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal(12-32))
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-30))

- For ABS equipped models, check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**ABS Hydraulic Unit Connector [B]**
**ECU Terminal 9 [C] ←→ ABS Hydraulic Unit Terminal 8 [D]**



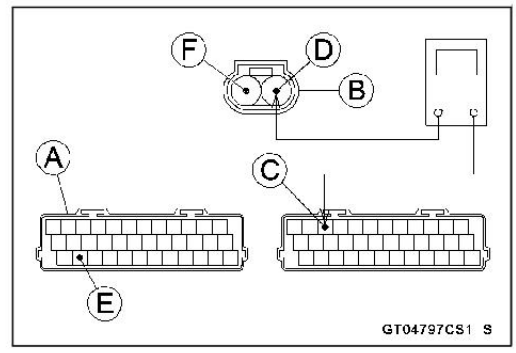

**Wiring Continuity Inspection**
**ABS Hydraulic Unit Connector [A] ←→**
**Front Wheel Rotation Sensor Connector [B]**
**ABS Hydraulic Unit Connector Terminal 12 [C] ←→ Sensor Terminal [D]**
**ABS Hydraulic Unit Connector Terminal 3 [E] ←→ Sensor Terminal [F]**



## Front Wheel Rotation Sensor

● For other than ABS equipped models, check the wiring for continuity between harness connectors.

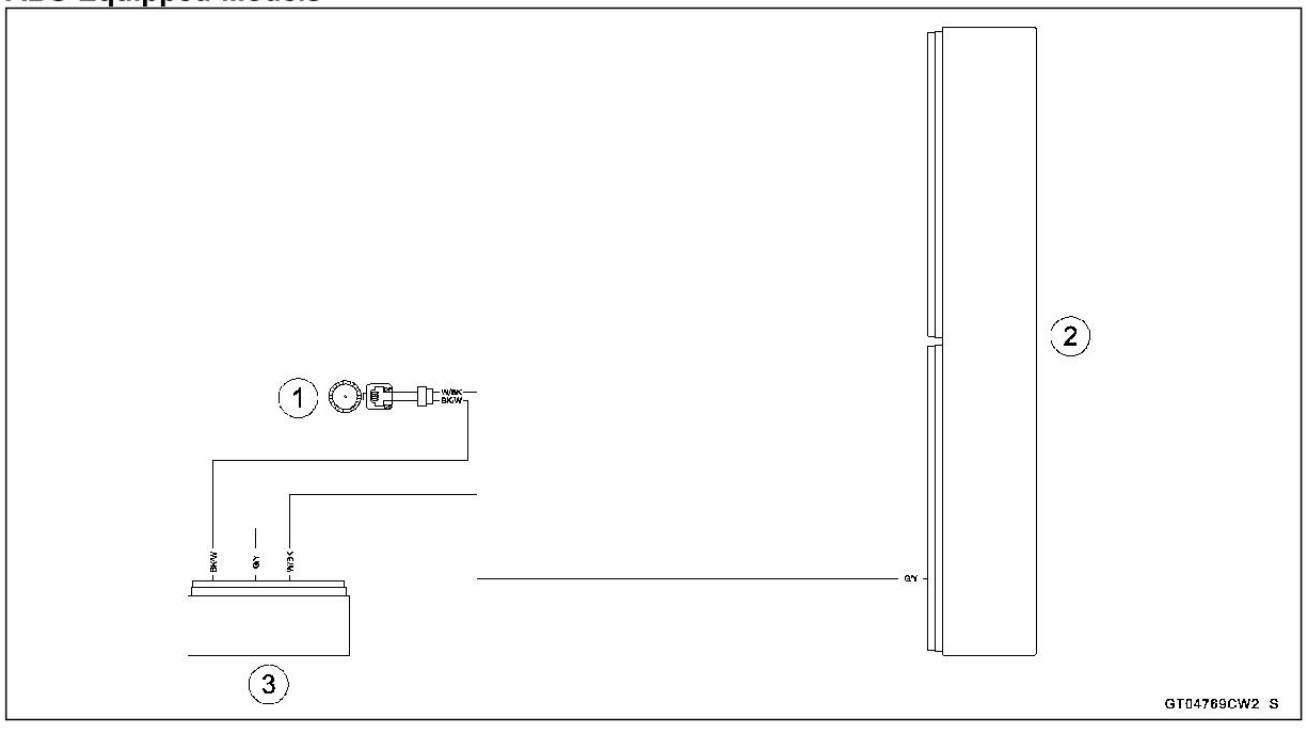
**Wiring Continuity Inspection**
**ECU Connector [A] ← →**
**Front Wheel Rotation Sensor Connector [B]**
**ECU Terminal 10 [C] ←→ Sensor Terminal [D]**
**ECU Terminal 71 [E] ←→ Sensor Terminal [F]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the front wheel rotation sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Front Wheel Rotation Sensor Circuit*

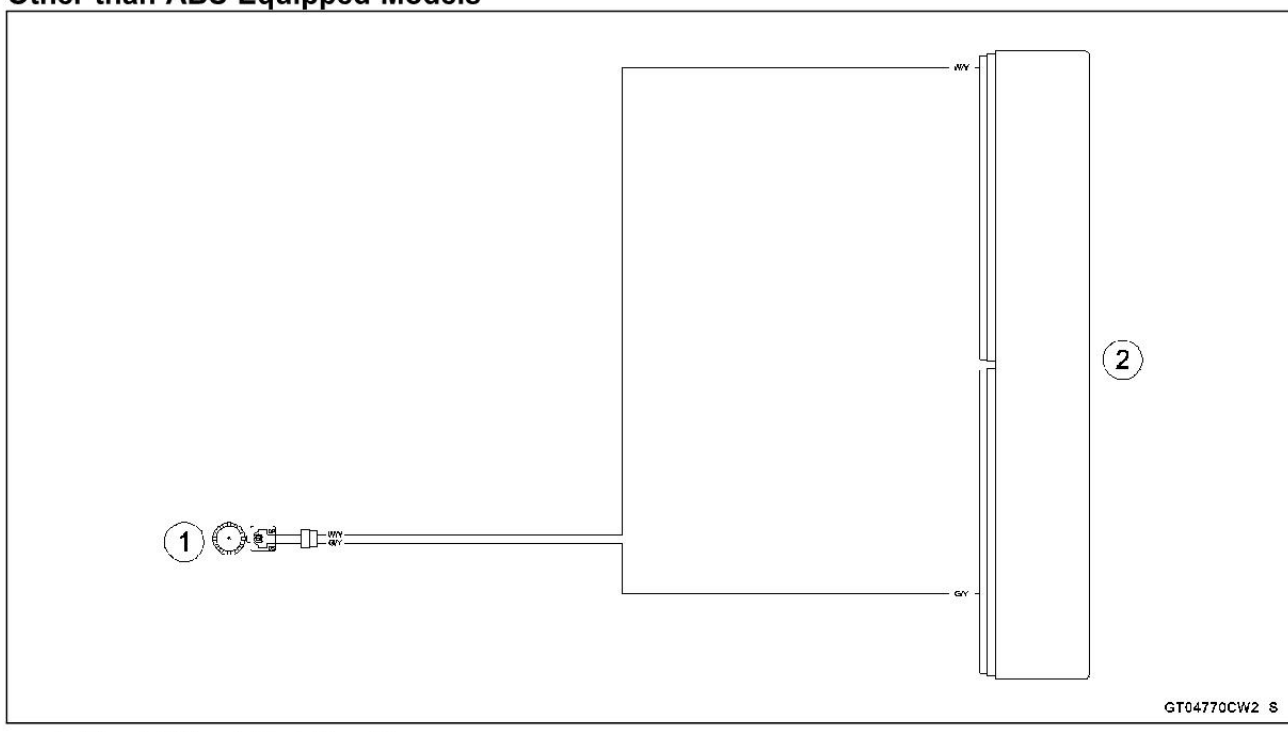
**ABS Equipped Models**




1. Front Wheel Rotation Sensor
2. ECU
3. ABS Hydraulic Unit

## Front Wheel Rotation Sensor

### Other than ABS Equipped Models



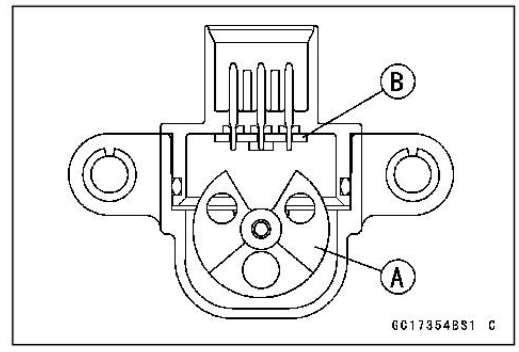

1. Front Wheel Rotation Sensor
2. ECU

## Vehicle-down Sensor

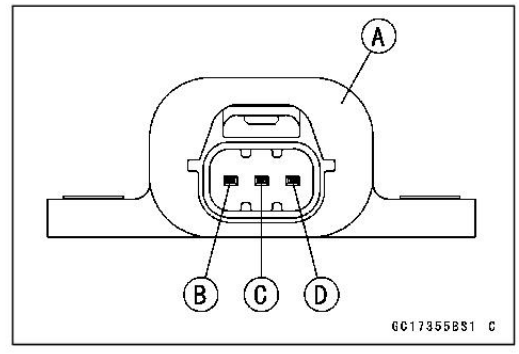
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 – 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay, the fuel injectors and the ignition system.

Hall IC [B]

When the motorcycle is down, the ignition switch is left on. If the starter button is pushed, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then turn it on.




Vehicle-down Sensor [A]
Ground Terminal [B]: G
Output Terminal [C]: Y/G
Power Source Terminal [D]: BL

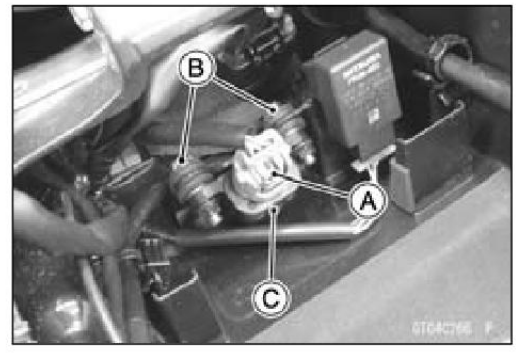



## Vehicle-down Sensor Inspection (Service Code 31)

### *Vehicle-down Sensor Removal*

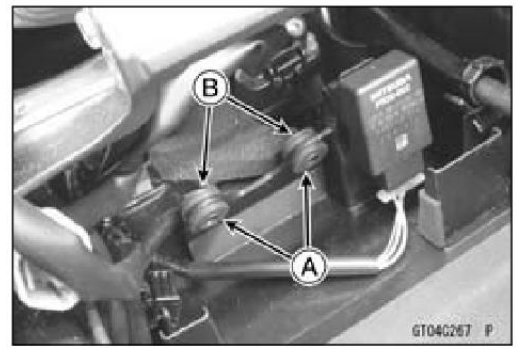
| *NOTICE* |
| --- |
| **Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

- Remove:
  Battery (see Battery Removal(16-24))
- Disconnect:
  Vehicle-down Sensor Connector [A]
- Remove:
  Vehicle-down Sensor Bolts [B] and Nuts
  Vehicle-down Sensor [C]



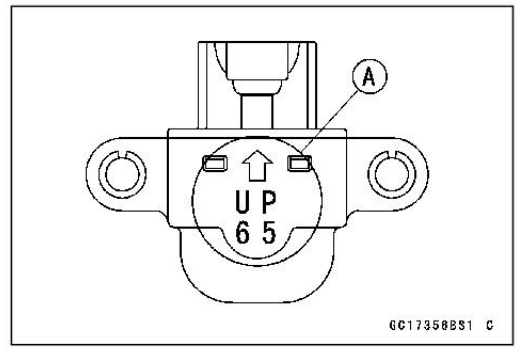

### *Vehicle-down Sensor Installation*

- Be sure to install the rubber dampers [A] and collars [B] on the rear fender.



## Vehicle-down Sensor

● The UP mark [A] of the sensor should face upward.




**⚠ WARNING**

**Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor bracket.**

● Tighten:

**Torque - Vehicle-down Sensor Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)**

● Install the removed parts.

### *DTC C0064*

(Checking wire for short circuit to ground)

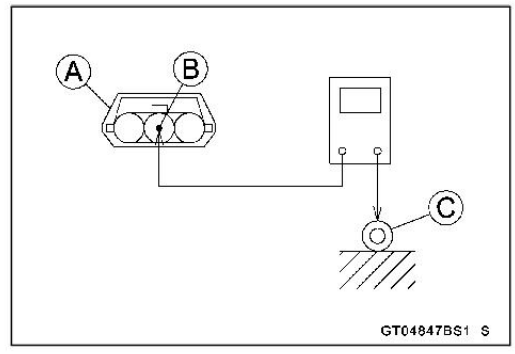
● Remove:
Battery (see Battery Removal(16-24))

● Disconnect:
Vehicle-down Sensor Connector [A]

● Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**Y/G lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

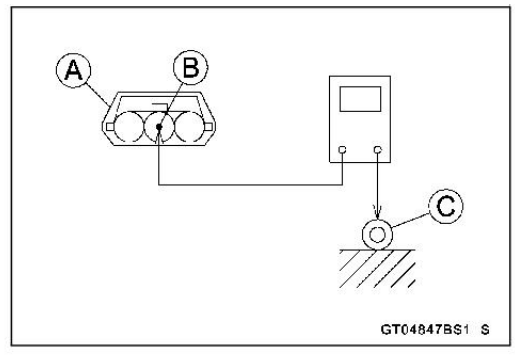



(Checking wire for short circuit to power supply wire)

● Connect the digital meter to the connector [A].

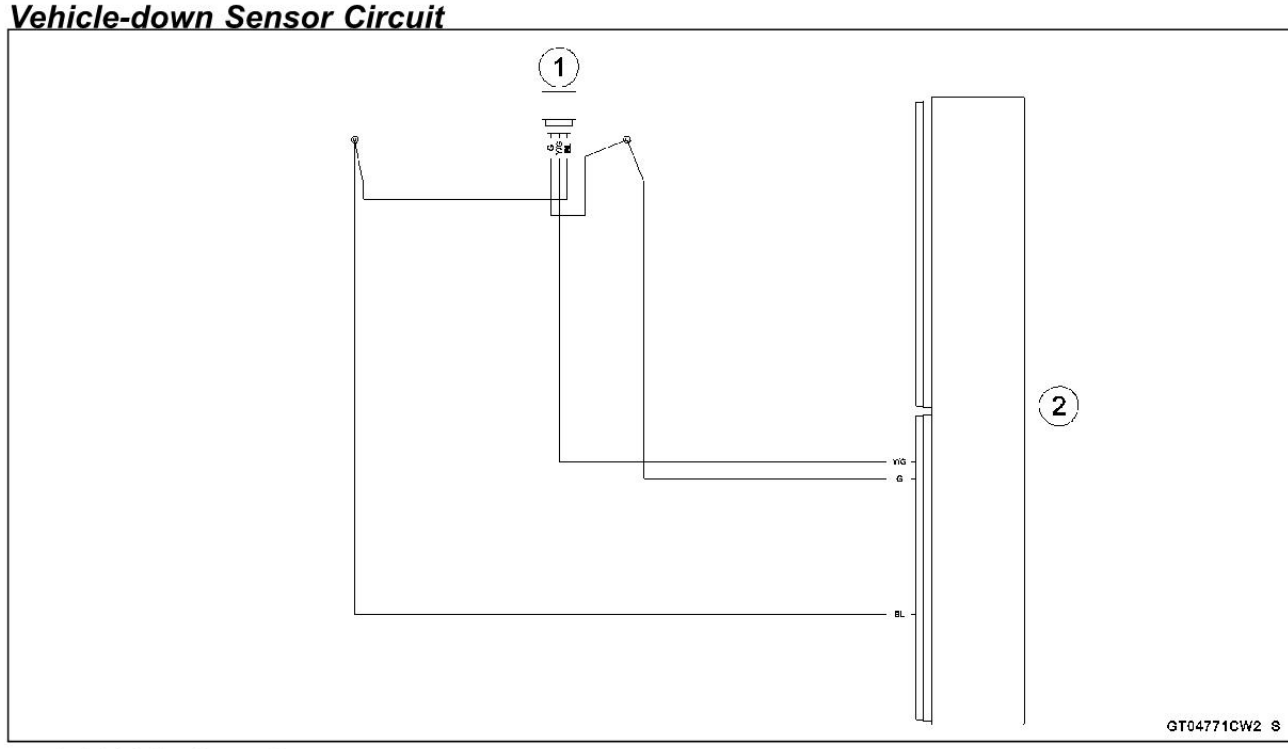
**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → Y/G lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

● Install the battery temporarily (see Battery Installation(16-24)).
● Measure the measuring voltage.
● Turn the ignition switch on.
★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the vehicle-down sensor.
★Even if all checks are good, the problem still exists, replace the ECU.



## Vehicle-down Sensor

### *Vehicle-down Sensor Circuit*



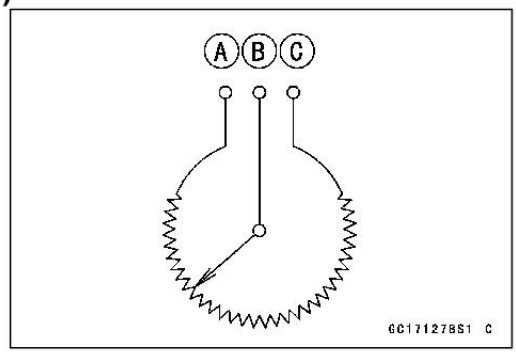

1. Vehicle-down Sensor
2. ECU

## Subthrottle Sensor

### Subthrottle Sensor Inspection (Service Code 32)

The subthrottle sensor is a rotating variable resistor that change output voltage according to throttle operating. The ECU senses this voltage change and determines fuel injection quantity, and ignition timing according to engine rpm, and throttle opening.

Input Terminal [A]: BL
Output Terminal [B]: BL/W
Ground Terminal [C]: G




#### *Subthrottle Sensor Removal/Adjustment*

***NOTICE***

**Do not remove or adjust the subthrottle sensor [A] since it has been adjusted and set with precision at the factory.**
**Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle sensor can damage it.**

#### *DTC P0220*

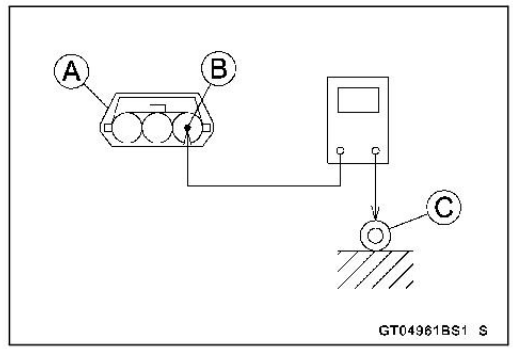
(Checking wire for short circuit to ground)

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Subthrottle Sensor Connector [A]

- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**BL/W lead [B] ←→ Frame Ground Terminal [C]**

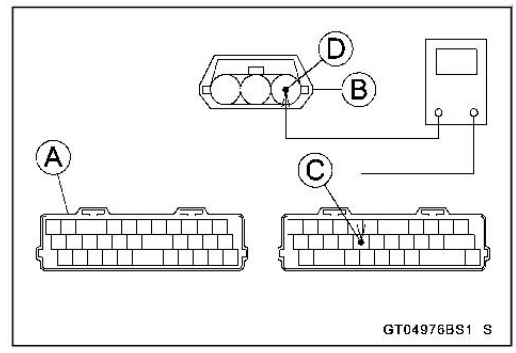
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



## Subthrottle Sensor

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Subthrottle Sensor Connector [B]**
**ECU Terminal 20 [C] ←→ Sensor Terminal [D]**



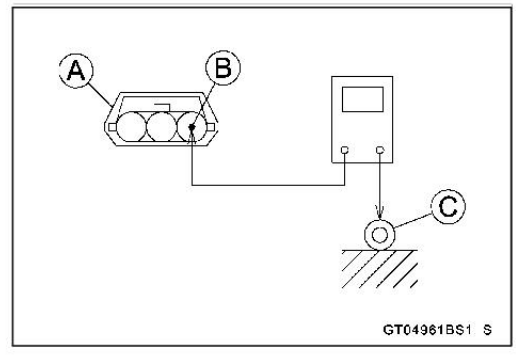

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the subthrottle sensor connector (see Subthrottle Sensor Circuit(17-92)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the subthrottle sensor connector and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0223*

(Checking wire for short circuit to power supply wire)
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Disconnect:
  Subthrottle Sensor Connector [A]

- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → BL/W lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

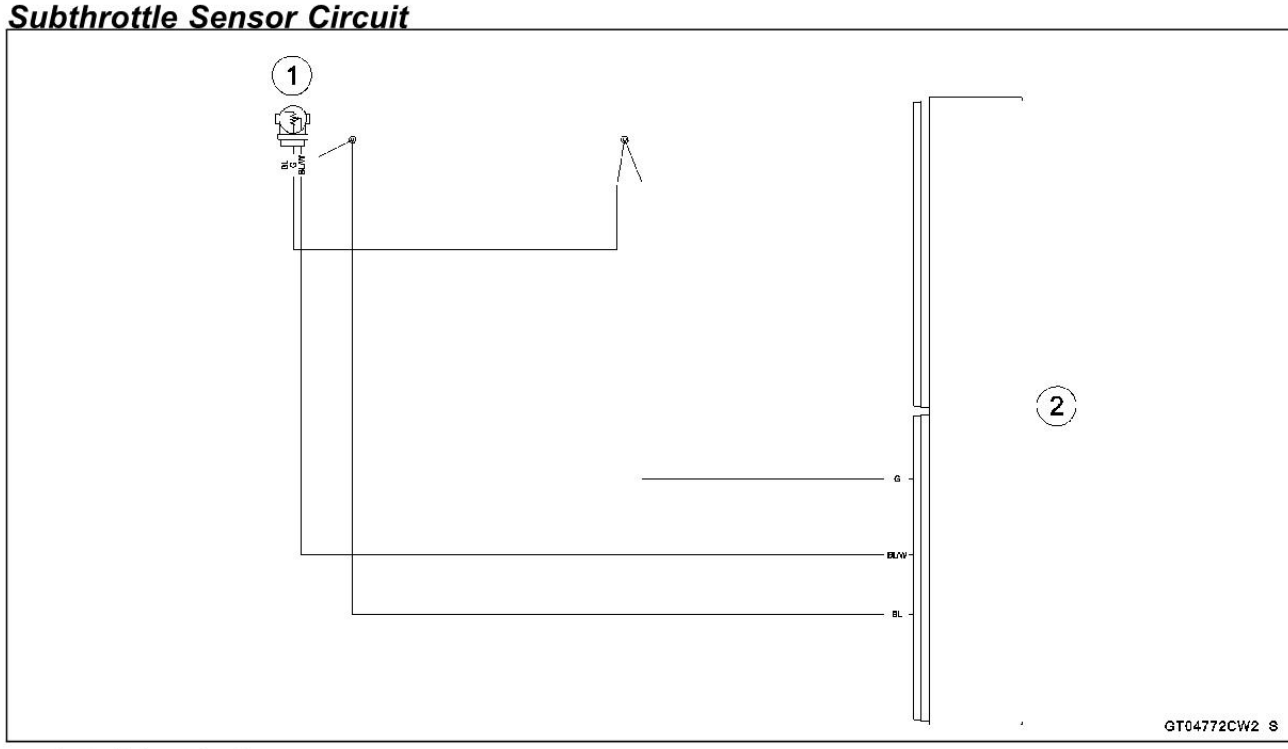



- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the throttle body assy.
★Even if all checks are good, the problem still exists, replace.

## Subthrottle Sensor

### *Subthrottle Sensor Circuit*

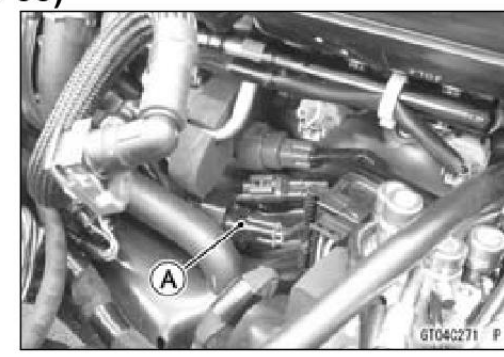



1. Subthrottle Sensor
2. ECU

## Front Oxygen Sensor

### Front Oxygen Sensor Inspection (Service Code 33)

#### *Front Oxygen Sensor Removal*



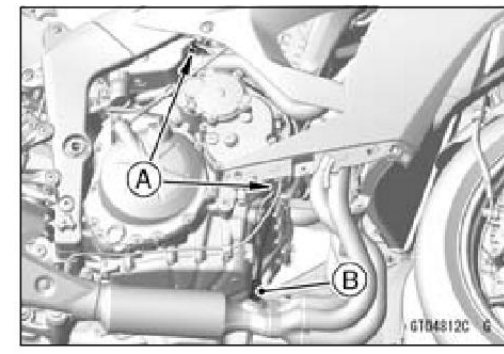

**NOTICE**

**Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.**

**NOTICE**

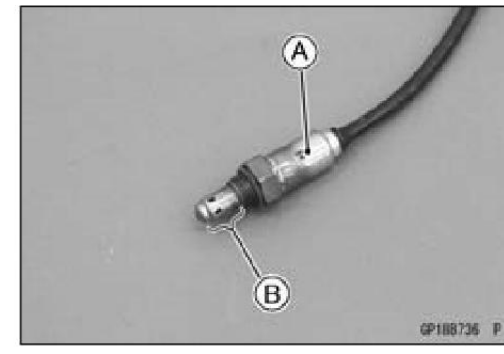
**Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.**

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Right Lower Fairing (see Lower Fairing Removal(15-9))
- Disconnect:
  Front Oxygen Sensor Connector [A]




- Clear the lead from the clamps [A].
- Remove:
  Front Oxygen Sensor [B]

#### *Front Oxygen Sensor Installation*




**NOTICE**

**Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.**

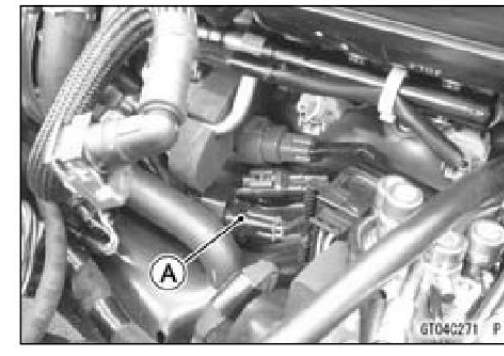
- Tighten:

  **Torque - Front Oxygen Sensor: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Run the front oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

#### *DTC P0130*

(Checking wire for short circuit to ground)



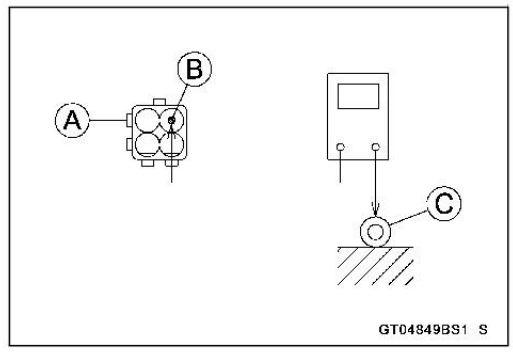

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Front Oxygen Sensor Connector [A]

## Front Oxygen Sensor

- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

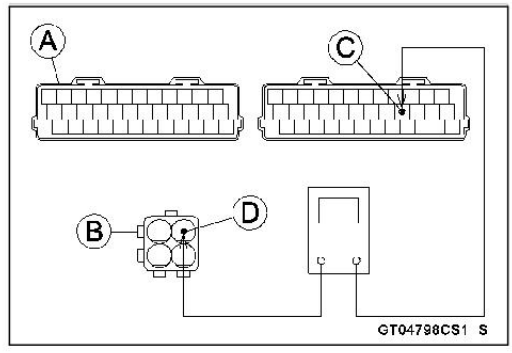
**Wiring Continuity Inspection**
**BL/Y lead [B] ←→ Frame Ground Terminal [C]**

- If there is continuity, repair or replace the main harness.
- If there is no continuity, go to next check.




(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

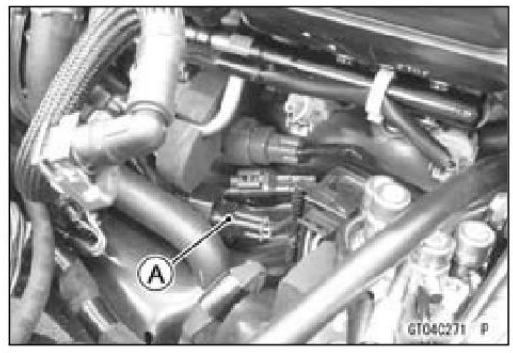
**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Front Oxygen Sensor Connector [B]**
**ECU Terminal 16 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the front oxygen sensor (see Front Oxygen Sensor Circuit(17-96)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0132*

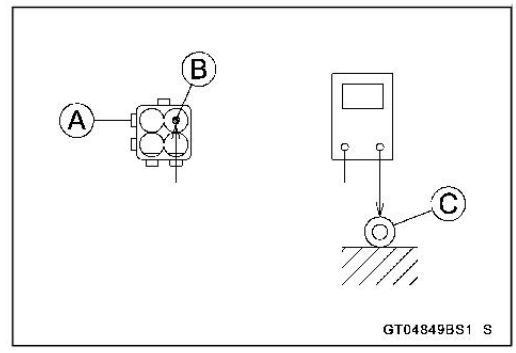
(Checking wire for short circuit to power supply wire)
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Front Oxygen Sensor Connector [A]



## Front Oxygen Sensor

● Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → BL/Y lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**



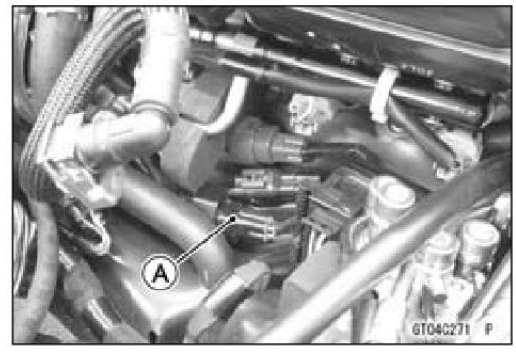

● Measure the measuring voltage.
● Turn the ignition switch on.
★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the front oxygen sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0133*

● When this code is displayed, replace the front oxygen sensor.

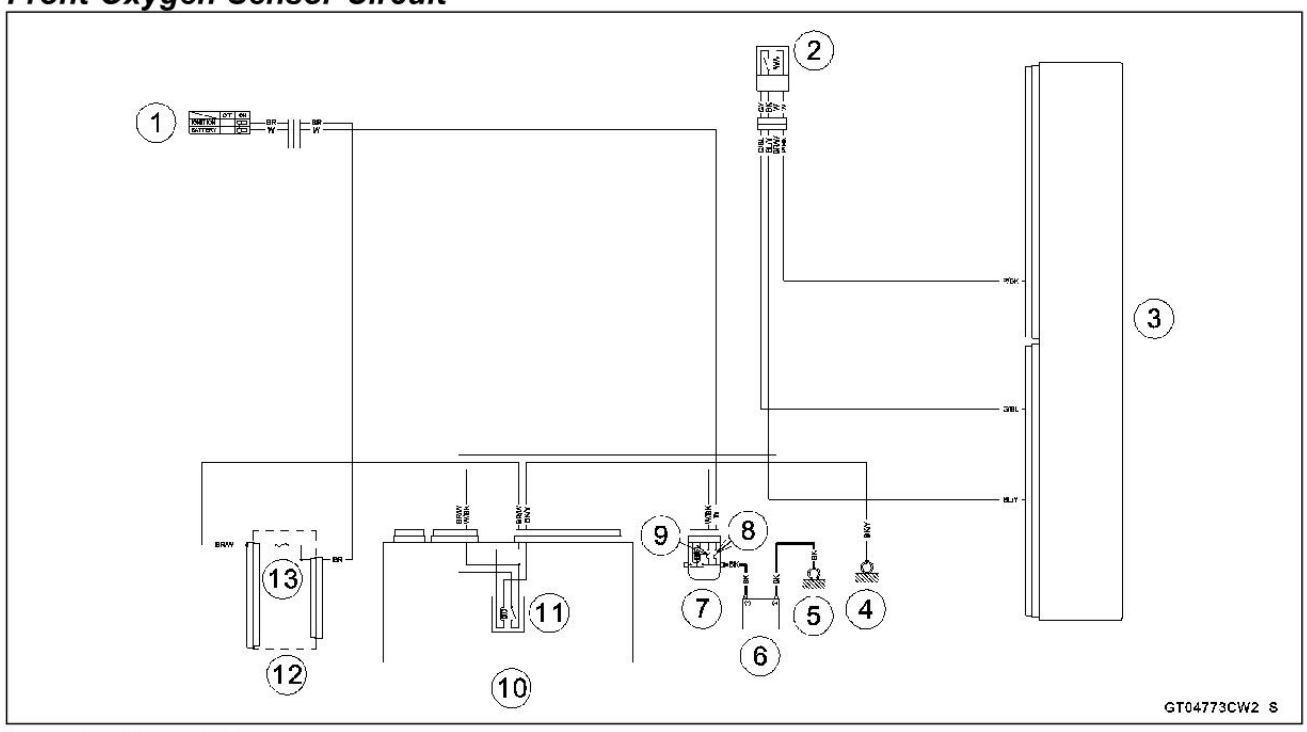
### *DTC P2A00*

● Remove:
Fuel Tank (see Fuel Tank Removal(3-38))
● Disconnect:
Front Oxygen Sensor Connector [A]
ECU Connectors (see ECU Removal(3-12))
● Check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★If the terminals are good, check the front oxygen sensor wirings (see Front Oxygen Sensor Circuit(17-96)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.



## Front Oxygen Sensor

### *Front Oxygen Sensor Circuit*




1. Ignition Switch
2. Front Oxygen Sensor
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Exhaust Butterfly Valve Actuator Sensor

### Exhaust Butterfly Valve Actuator Sensor Inspection (Service Code 34)

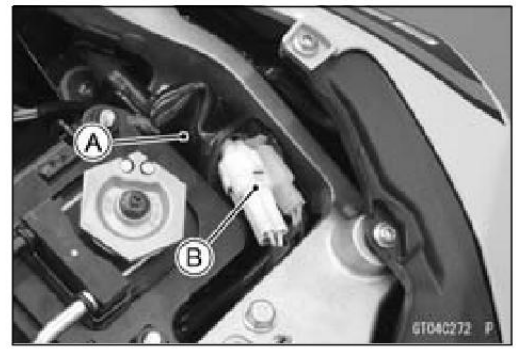
#### *Exhaust Butterfly Valve Actuator Sensor Removal*

The exhaust butterfly valve actuator sensor is built in the exhaust butterfly valve actuator. So, the sensor itself can not be removed. Remove the exhaust butterfly valve actuator (see Exhaust Butterfly Valve Actuator Removal(5-46)).

#### *DTC P048B*

(Checking wire for short circuit to ground)

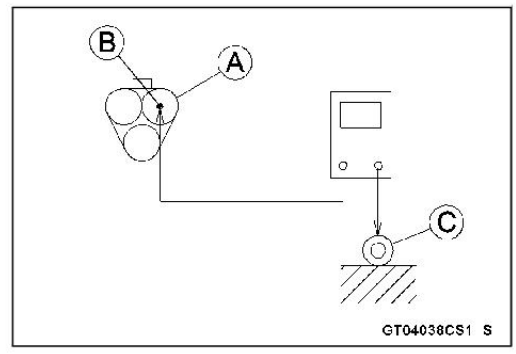
- Remove:
  Rear Seat (see Rear Seat Removal(15-8))
- Slide the dust cover [A].
- Disconnect:
  Exhaust Butterfly Valve Actuator Sensor Connector (3 Pins) [B]




- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**GY lead [B] ←→ Frame Ground Terminal [C]**

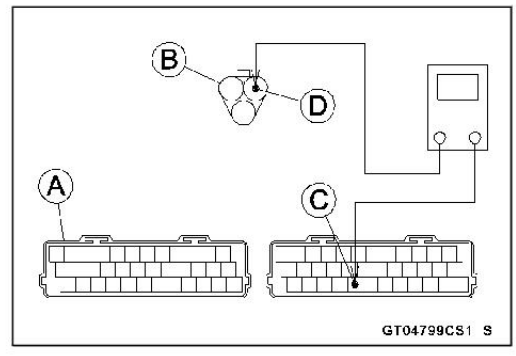
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.




(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

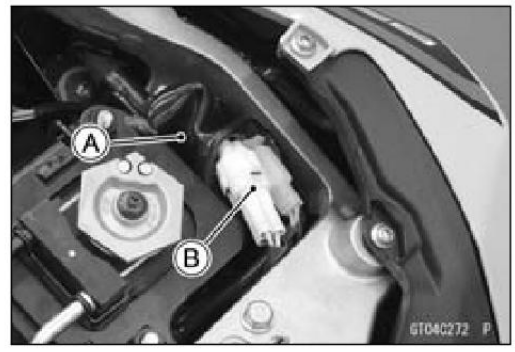
**Wiring Continuity Inspection**
**ECU Connector [A] ← →**
**Exhaust Butterfly Valve Actuator Sensor Connector [B]**
**ECU Terminal 32 [C] ←→ Sensor Terminal [D]**




★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the exhaust butterfly valve actuator sensor (see Exhaust Butterfly Valve Actuator Sensor Circuit(17-99)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the exhaust butterfly valve actuator and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

## Exhaust Butterfly Valve Actuator Sensor

### *DTC P048C*




- Remove:
  Rear Seat (see Rear Seat Removal(15-8))
- Slide the dust cover [A].
- Disconnect:
  Exhaust Butterfly Valve Actuator Sensor Connector (3 Pins) [B]
  ECU Connectors (see ECU Removal(3-12))
- Check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the exhaust butterfly valve actuator and/or ECU.

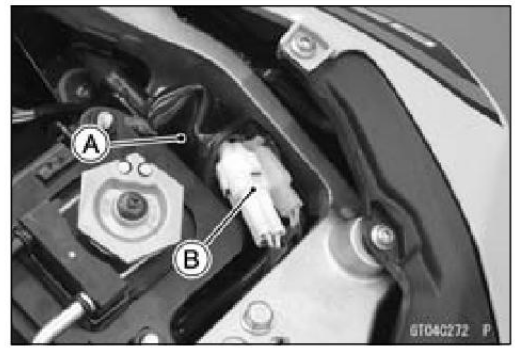
★If the terminals are good, check the exhaust butterfly valve actuator sensor wirings (see Exhaust Butterfly Valve Actuator Sensor Circuit(17-99)).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, replace the exhaust butterfly valve actuator and/or ECU.

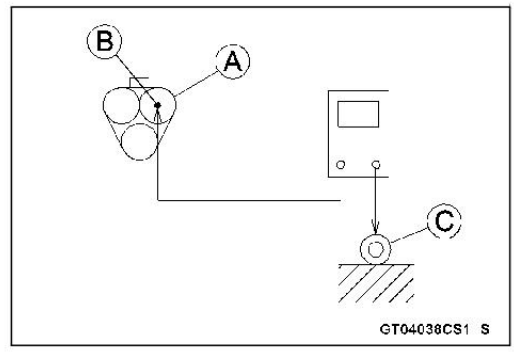
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P048E*




(Checking wire for short circuit to power supply wire)

- Remove:
  Rear Seat (see Rear Seat Removal(15-8))
- Slide the dust cover [A].
- Disconnect:
  Exhaust Butterfly Valve Actuator Sensor Connector (3 Pins) [B]




- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Valve Connector:**
**Digital Meter (+) → GY lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the measuring voltage.
- Turn the ignition switch on.

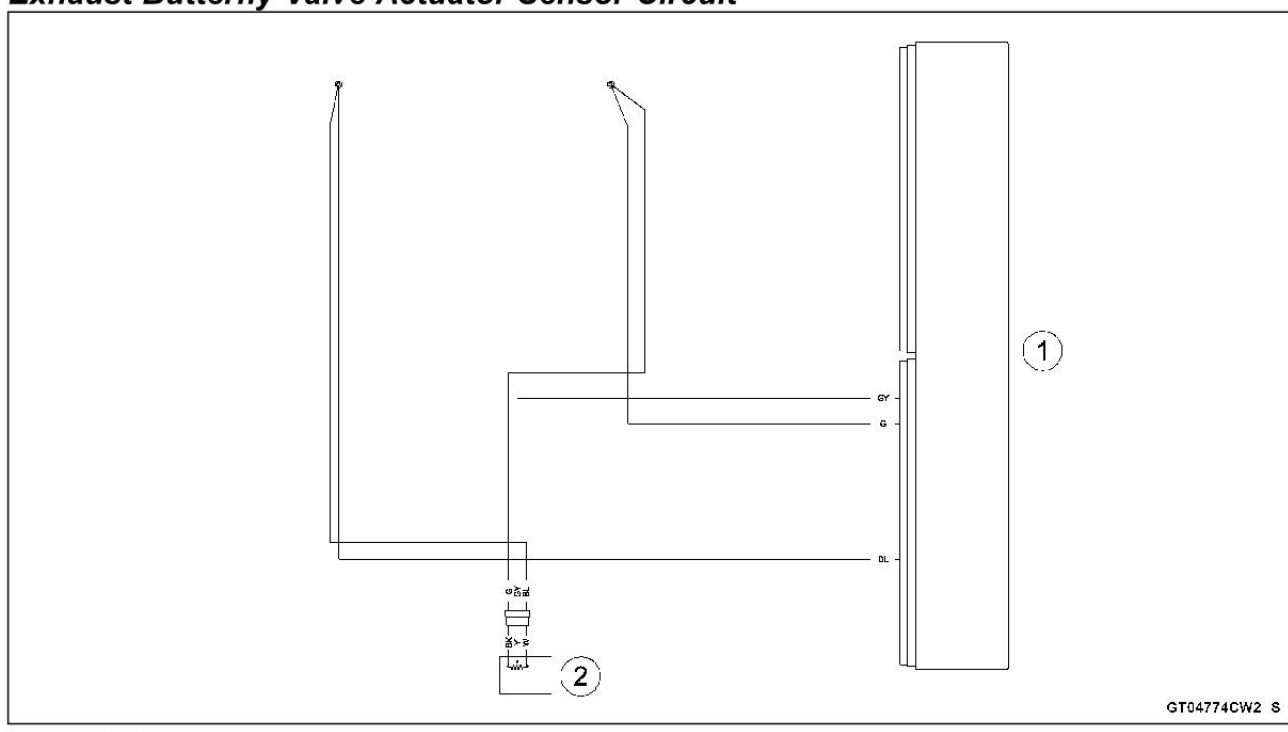
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, replace the exhaust butterfly valve actuator.

★Even if all checks are good, the problem still exists, replace the ECU.

## Exhaust Butterfly Valve Actuator Sensor

### *Exhaust Butterfly Valve Actuator Sensor Circuit*

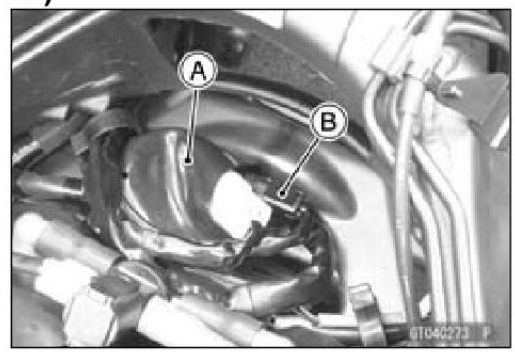



1. ECU
2. Exhaust Butterfly Valve Actuator

## Immobilizer Amplifier (Equipped Models)

## Immobilizer Amplifier Inspection (Service Code 35)

*DTC P1507*

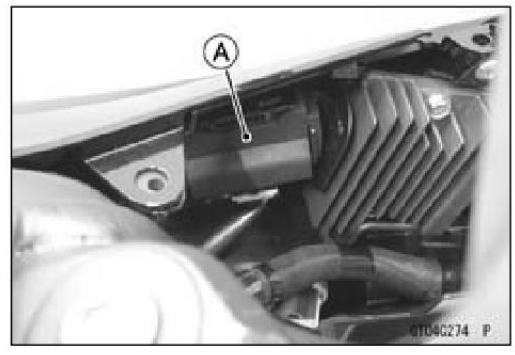



**Antenna Resistance Inspection**

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-33))
- Slide the dust cover [A].
- Disconnect the antenna connector [B].
- Measure the antenna resistance.

**Antenna Resistance**
**Connections: BK lead ←→ BK/W lead**
**Standard: About 3.0 – 4.6 Ω**

★If the reading is out of the standard, replace the ignition switch (see Immobilizer System Parts Replacement(16-95)).
★If the reading is within the standard, check the wiring to the amplifier (see Immobilizer System Circuit(17-101)).
★If the wiring is good, check the input voltage of the amplifier.




**Amplifier Input Voltage Inspection**

**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Left Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
- Remove the immobilizer amplifier [A] from the bracket.

○Do not disconnect the immobilizer amplifier connector.

- Connect a digital meter to the amplifier connector with needle adapter set.

**Special Tool - Needle Adapter Set: 57001-1874**

**Amplifier Input Voltage**
**Connections to Amplifier Connector:**
**Digital Meter (+) → BR/W lead**
**Digital Meter (–) → BK/Y lead**

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

**Input Voltage**
**Standard: Battery Voltage**

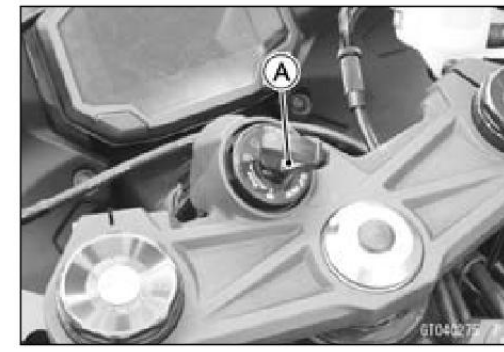
- Turn the ignition switch off.

★If the reading is out of the standard, check the wiring (see Immobilizer System Circuit(17-101)).
★If the reading is within the standard, check the wiring to ECU (see Immobilizer System Circuit(17-101)).
★If the wiring is good, replace the immobilizer amplifier (see Immobilizer System Parts Replacement(16-95)).

## Blank Key Detection (Equipped Models)

### Ignition Key Inspection (Service Code 36)

***DTC P1508***




- This code appears in the following conditions.

○The transponder [A] in the ignition key is malfunction.

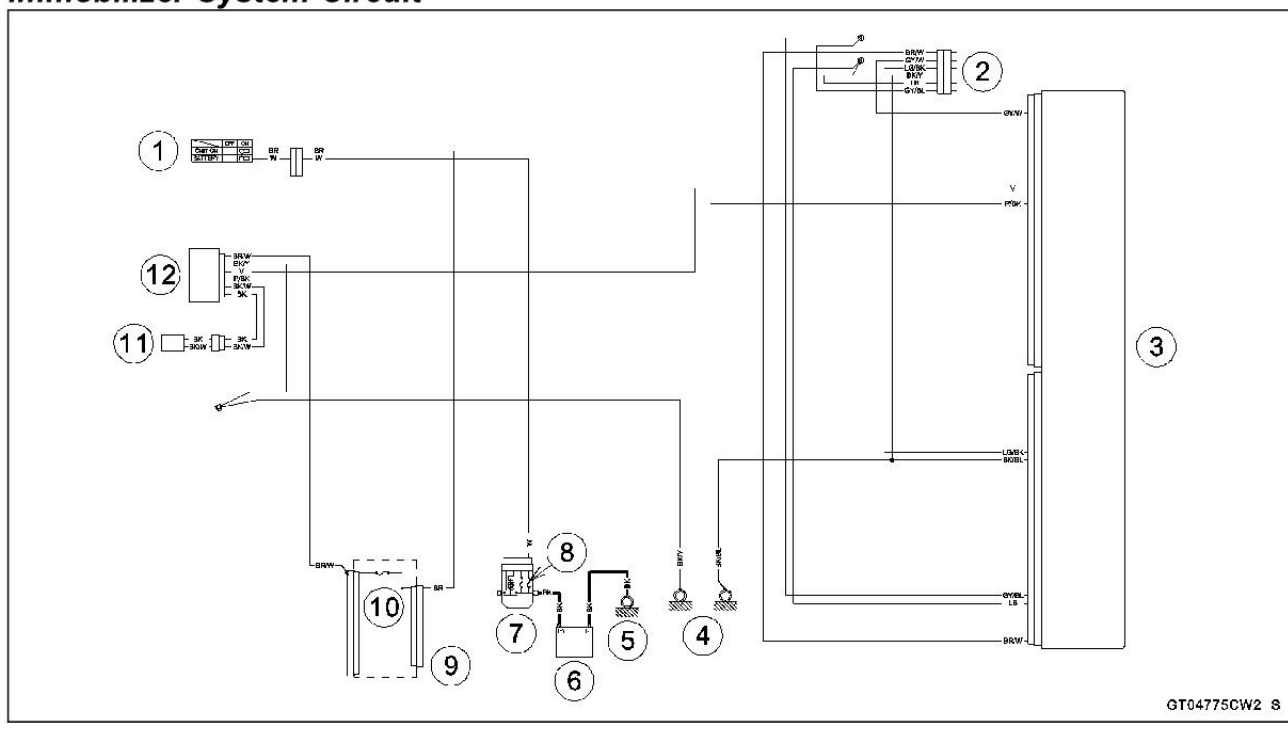
○When the spare key of unregistration is used.

○When the ignition key is registered in the registered ECU.

- Register the ignition key correctly (see Key Registration(16-77)).

★If the service code 36 appears again, the transponder in the key is malfunction, replace it.

***Immobilizer System Circuit***




1. Ignition Switch
2. Immobilizer/Kawasaki Diagnostic System Connector
3. ECU
4. Frame Grounds
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. Fuse Box (1)
10. Ignition Fuse 15 A
11. Immobilizer Antenna
12. Immobilizer Amplifier

## ECU Communication Error

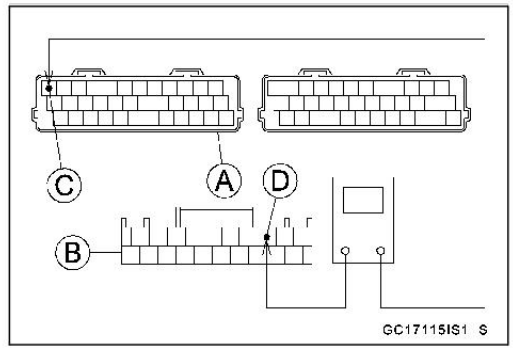
### *ECU Communication Line Inspection (Service Code 39)*

○When the data is not sent from the ECU to the meter unit, the service code 39 is displayed.
○The service code 39 is detected with meter unit.

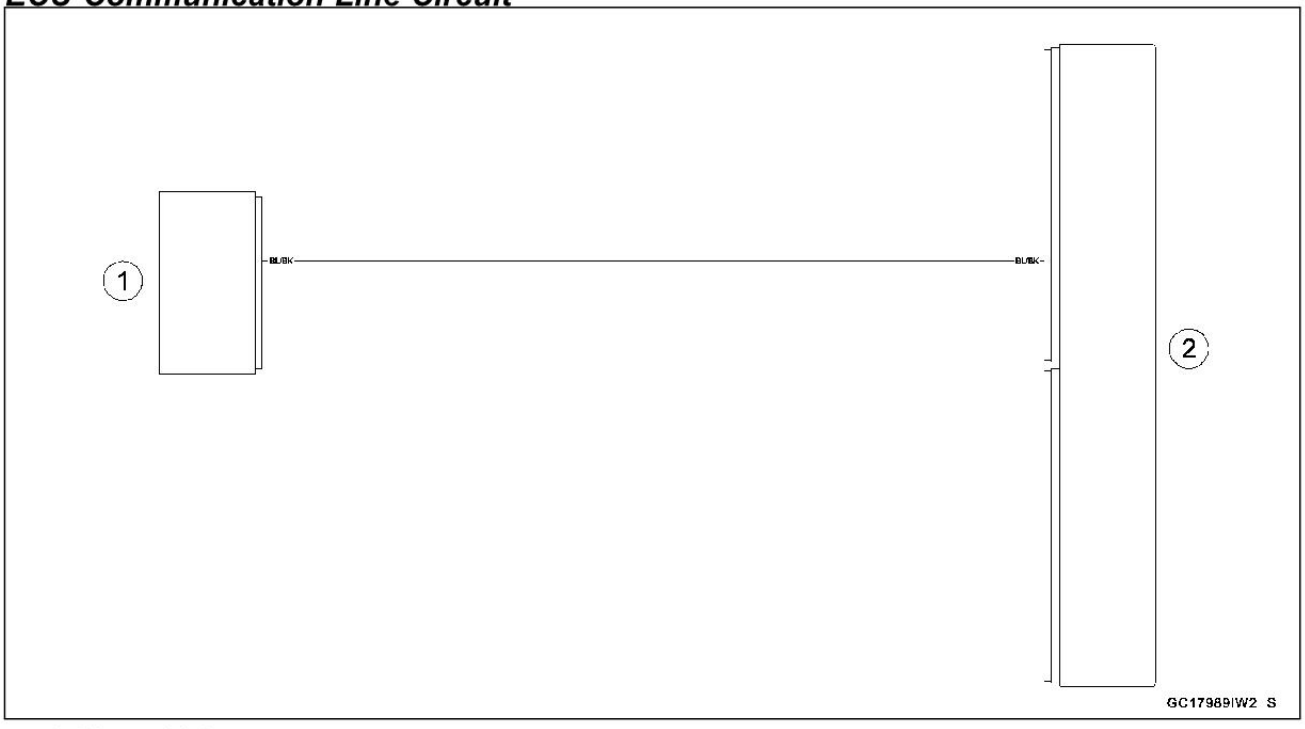
● Remove the ECU and meter unit, check the wiring for continuity between main harness connectors.
○Disconnect the ECU and meter unit connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→ Meter Unit Connector [B]**
**ECU Terminal 48 [C] ←→ Meter Terminal [D]**

★If the wiring is good, check the meter unit (see Meter Unit Inspection(16-67)).
★If the meter unit is normal, replace the ECU.




### *ECU Communication Line Circuit*



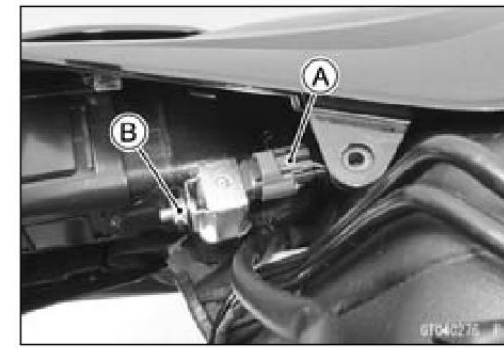

1. Meter Unit
2. ECU

## Purge Valve (Equipped Models)

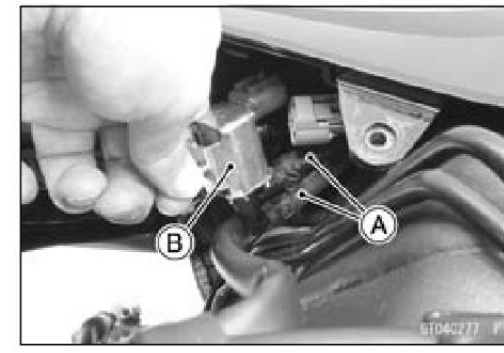
### Purge Valve Inspection (Service Code 3A)

#### *Purge Valve Removal*

- Remove:
  Right Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
- Disconnect the purge valve connector [A].
- Remove the nut [B].




- Slide the clamps and disconnect the hoses [A].
- Remove the purge valve [B].




#### *Purge Valve Installation*

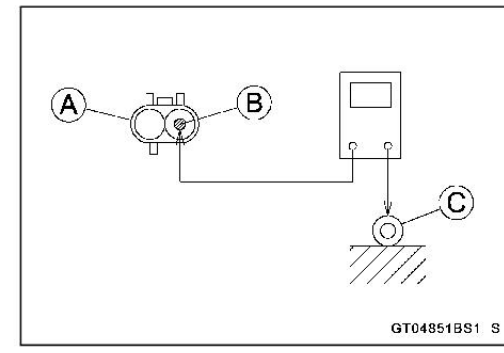
- Installation is the reverse of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

#### *DTC P0443*

(Checking wire for short circuit to ground)

- Disconnect:
  Purge Valve Connector (see Purge Valve Removal(17-103))
- Check the wiring for short circuit to ground by checking continuity between the connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**R/Y lead [B] ←→ Frame Ground Terminal [C]**



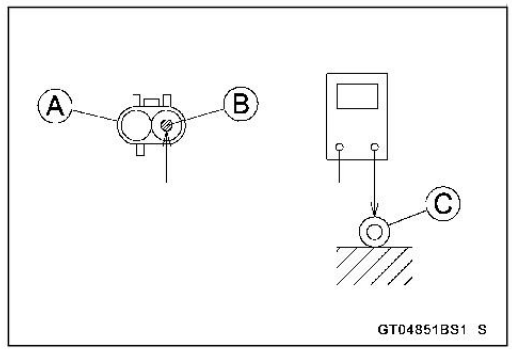

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the purge valve.
★Even if all checks are good, the problem still exists, replace the ECU.

## Purge Valve (Equipped Models)

### *DTC P0459*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Purge Valve Connector (see Purge Valve Removal(17-103))
- Connect the digital meter to the connector [A].

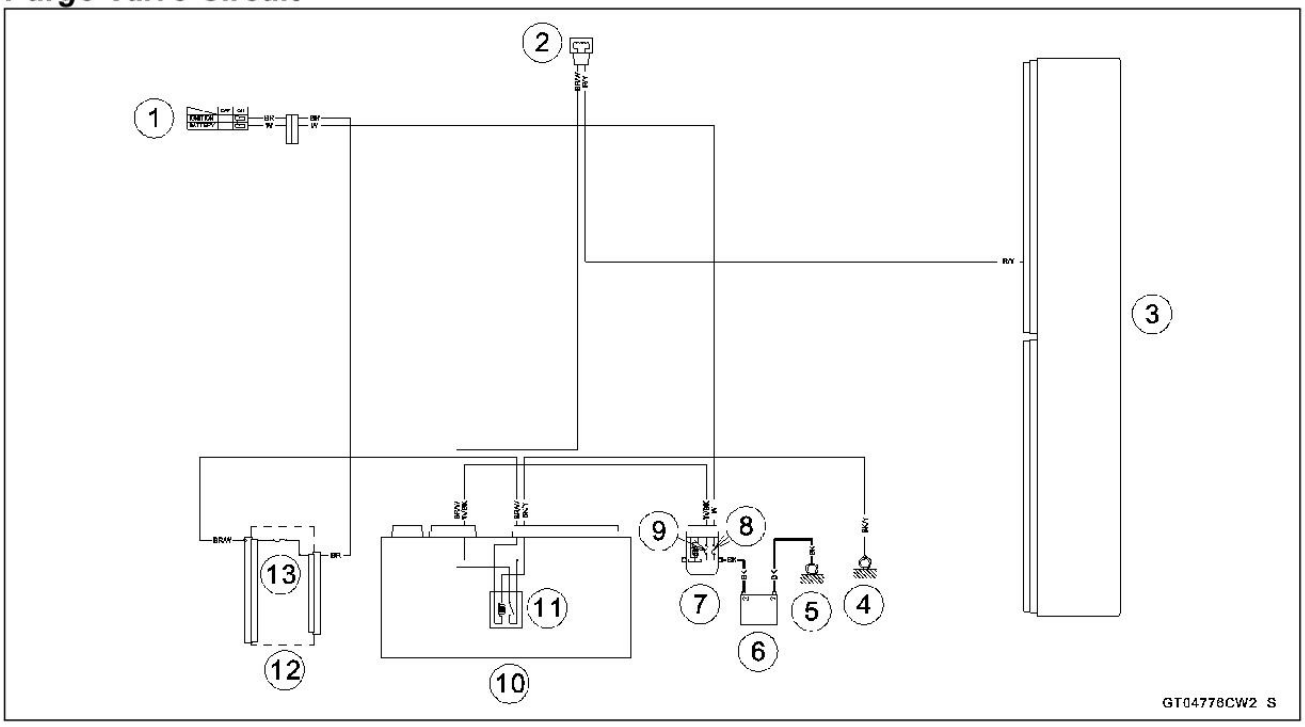



**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → R/Y lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the purge valve.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Purge Valve Circuit*




1. Ignition Switch
2. Purge Valve
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Stater Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Quick Shifter Sensor

### Quick Shifter Sensor Inspection (Service Code 3E)

#### *Quick Shifter Sensor Removal*

● Refer to the Shift Pedal Removal (see Shift Pedal Removal(9-46)).

#### *Quick Shifter Sensor Installation*

● Refer to the Shift Pedal Installation (see Shift Pedal Installation(9-46)).

#### *DTC P0826*

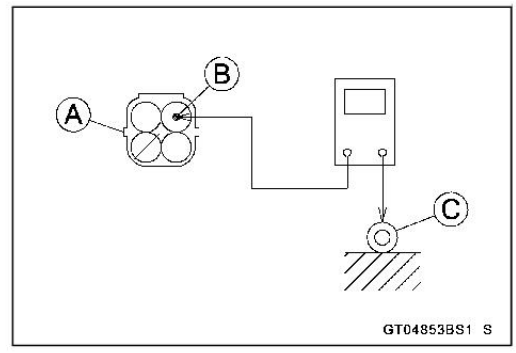
(Checking wire for short circuit to ground)

● Disconnect:
Quick Shifter Sensor Connector (see Shift Pedal Removal(9-46))

● Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**G/Y lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

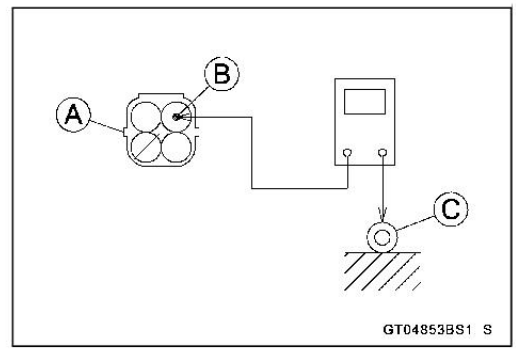



(Checking wire for short circuit to power supply wire)

● Connect the digital meter to the connector [A].

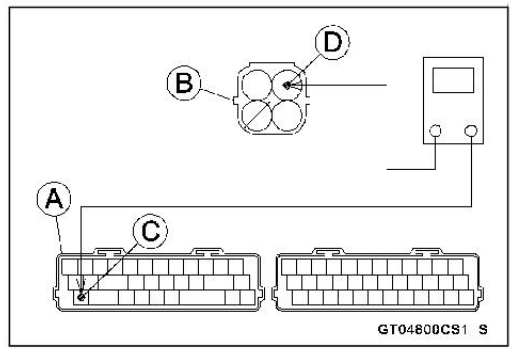
**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → G/Y lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

● Measure the measuring voltage.
● Turn the ignition switch on.
★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, go to next check.



## Quick Shifter Sensor

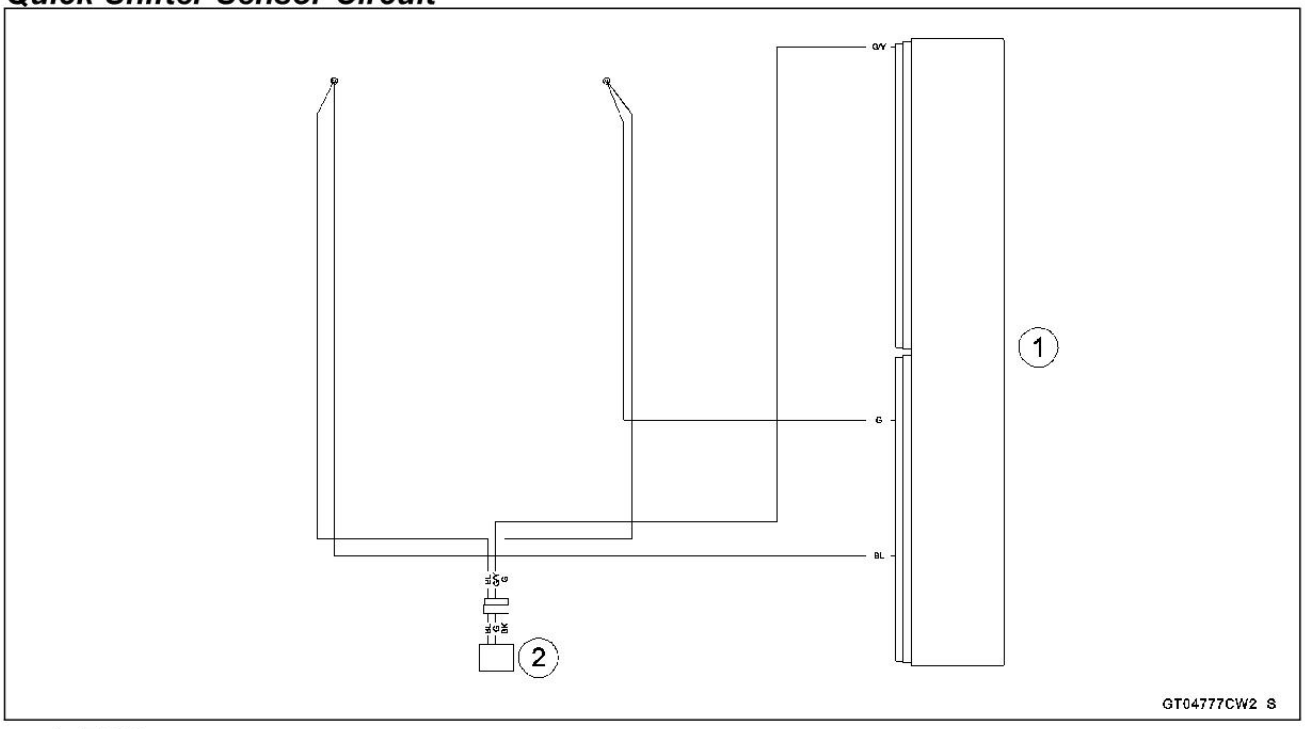
(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.




**Wiring Continuity Inspection**
**ECU Connector [A] ← →**
**Quick Shifter Sensor Connector [B]**
**ECU Terminal 72 [C] ← → Sensor Terminal [D]**

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the quick shifter sensor (see Quick Shifter Sensor Circuit(17-106)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the quick shifter sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *Quick Shifter Sensor Circuit*




1. ECU
2. Quick Shifter Sensor

## Fuel Injectors

### Fuel Injector Inspection (Service Code 41, 42, 43, 44)

Fuel Injector #1: Service Code 41 (DTC P0201)
Fuel Injector #2: Service Code 42 (DTC P0202)
Fuel Injector #3: Service Code 43 (DTC P0203)
Fuel Injector #4: Service Code 44 (DTC P0204)

#### *Fuel Injector Removal*

● Refer to the Throttle Body Assy Disassembly (see Throttle Body Assy Disassembly(3-30)).

#### *Fuel Injector Installation*

● Refer to the Throttle Body Assy Assembly (see Throttle Body Assy Assembly(3-31)).

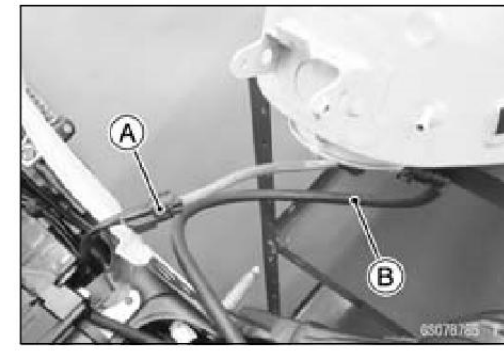
#### *DTC P0201, P0202, P0203, P0204*

**Fuel Injector Audible Inspection**

**NOTE**

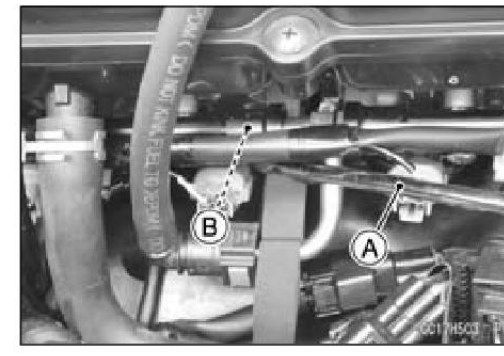
○*Be sure the battery is fully charged.*

● Remove:
Fuel Tank (see Fuel Tank Removal(3-38))
Fuel Hose (see Fuel Hose Replacement(2-24))
● Connect the following parts temporarily.
Fuel Pump Connector [A]
Extension Tube [B]




**Special Tool - Extension Tube: 57001-1578**

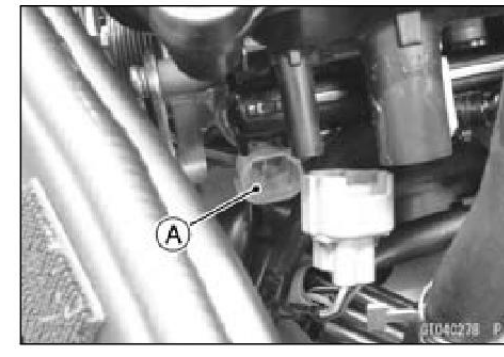
● Start the engine, and let it idle.
● Apply the flat tip screwdriver [A] to the fuel injector [B].
○Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.
○A sound scope can also be used.
○The click interval becomes shorter as the engine speed rises.
● Do the same for the other fuel injectors.
★If all the fuel injectors click at a regular intervals, the fuel injectors are normal.
● Turn the ignition switch off.
★If any fuel injector does not click, check the fuel injector resistance.




**Fuel Injector Resistance Inspection**

● Disconnect the air cleaner drain hose and breather hose (see Air Cleaner Housing Removal(3-33)).
● Disconnect the fuel injector connector.
● Connect a digital meter to the terminals in each fuel injector [A].
● Measure the fuel injector resistance.

**Fuel Injector Resistance**
**Standard: About 11.7 – 12.3 Ω @20°C (68°F)**




★If the reading is out of the standard, replace the fuel injector.
★If the reading is within the standard, check the power source voltage.

## Fuel Injectors

### Fuel Injector Power Source Voltage Inspection

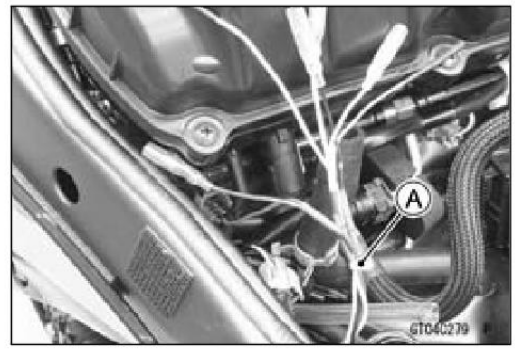
**NOTE**

○*Be sure the battery is fully charged.*

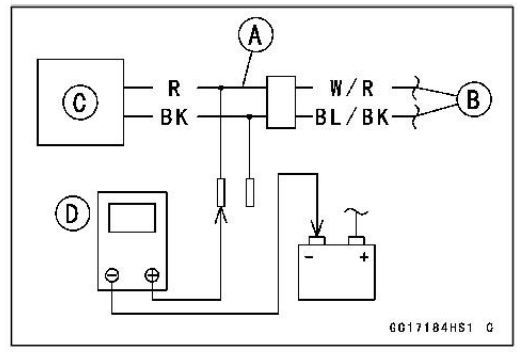
- Turn the ignition switch off.
- Disconnect the air cleaner drain hose and breather hose (see Air Cleaner Housing Removal(3-33)).
- Disconnect the fuel injector connector and connect the measuring adapter [A] between these connectors as shown.

  Main Harness [B]
  Fuel Injector #1 [C]

  **Special Tool - Measuring Adapter: 57001-1700**




- Connect a digital meter [D] to the measuring adapter lead.




**Fuel Injector Power Source Voltage**
**Connections to Adapter:**
**For Fuel Injector #1, #2, #3, #4**
**Digital Meter (+) → R (injector W/R) lead**
**Digital Meter (–) → Battery (–) Terminal**

- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

**Power Source Voltage**
**Standard: Battery Voltage for 3 seconds, and then 0 V**

- Turn the ignition switch off.

★If the reading is in specification, check the fuel injector output voltage.

(When power is detected but out of specification)

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection(16-101)).

(When power is not detected)

★If there is no battery voltage, check the fuel pump relay (see Relay Circuit Inspection(16-101)).

★If the fuel pump relay is normal, check the power source wiring (see Fuel Injector Circuit(17-111)).

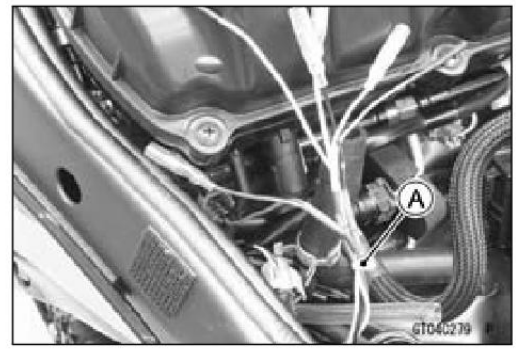
★If there is no continuity, repair or replace the main harness.

## Fuel Injectors

### Fuel Injector Output Voltage Inspection

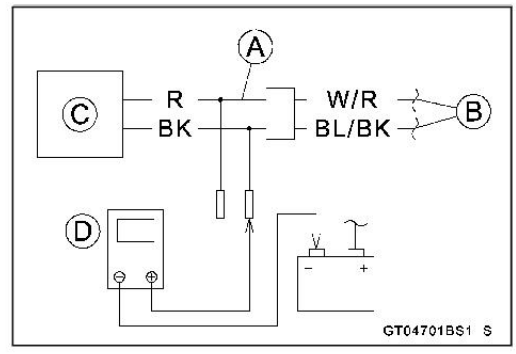
**NOTE**

○*Be sure the battery is fully charged.*




- Turn the ignition switch off.
- Disconnect the air cleaner drain hose and breather hose (see Air Cleaner Housing Removal(3-33)).
- Disconnect the fuel injector connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]

**Special Tool - Measuring Adapter: 57001-1700**




- Connect a digital meter [D] to the measuring adapter leads.

**Fuel Injector Output Voltage**
**Connections to Adapter:**
**For Fuel Injector #1**
**Digital Meter (+) → BK (injector BL/BK)**
**Digital Meter (–) → Battery (–) Terminal**
**For Fuel Injector #2**
**Digital Meter (+) → BK (injector BL/R)**
**Digital Meter (–) → Battery (–) Terminal**
**For Fuel Injector #3**
**Digital Meter (+) → BK (injector BL/O)**
**Digital Meter (–) → Battery (–) Terminal**
**For Fuel Injector #4**
**Digital Meter (+) → BK (injector BL/G)**
**Digital Meter (–) → Battery (–) Terminal**

- Measure the output voltage with the engine stopped and with the connector joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

**Output Voltage**
**Standard: Battery Voltage for 3 seconds, and then 0 V**

- Turn the ignition switch off.

## Fuel Injectors

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between main harness connectors.

○Disconnect the ECU and injector connector.

**Wiring Continuity Inspection**

**ECU Connector [A] ←→ Fuel Injector Connector [B]**

**For Fuel Injector #1 [C]**

**ECU Terminal 39 [D] ←→ Fuel Injector Terminal [E]**

**For Fuel Injector #2**

**ECU Terminal 51 ←→ Fuel Injector Terminal**

**For Fuel Injector #3**

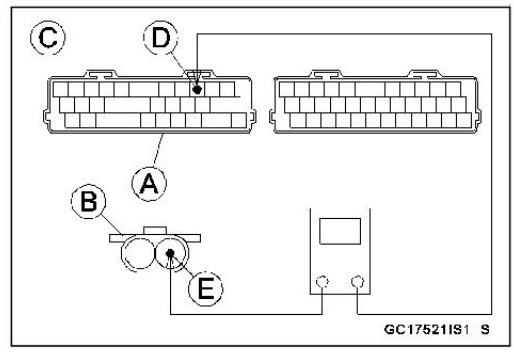
**ECU Terminal 40 ←→ Fuel Injector Terminal**

**For Fuel Injector #4**

**ECU Terminal 52 ←→ Fuel Injector Terminal**

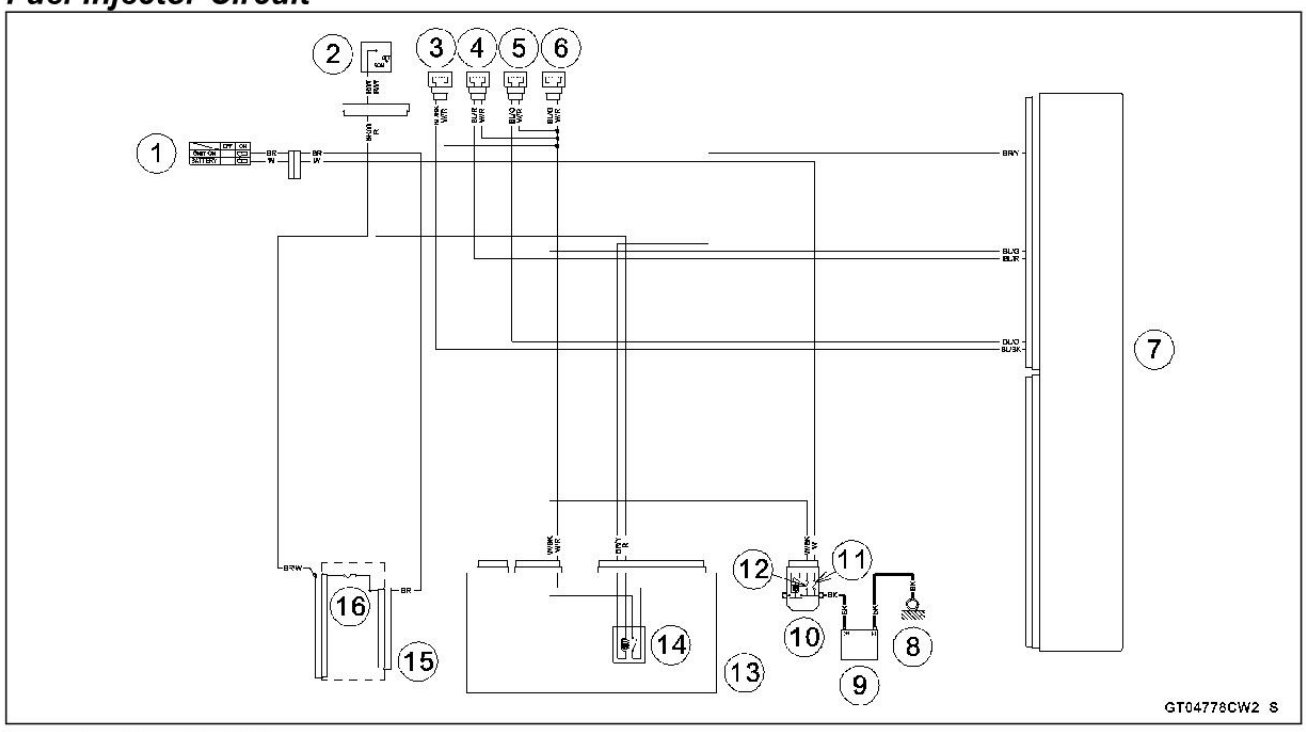
★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.



## Fuel Injectors

### *Fuel Injector Circuit*




1. Ignition Switch
2. Engine Stop Switch
3. Fuel Injector #1
4. Fuel Injector #2
5. Fuel Injector #3
6. Fuel Injector #4
7. ECU
8. Engine Ground
9. Battery
10. Starter Relay
11. Main Fuse 30 A
12. ECU Fuse 15 A
13. Relay Box
14. Fuel Pump Relay
15. Fuse Box (1)
16. Ignition Fuse 15 A

## Misfire

### Misfire Inspection (Service Code 4E)

Multiple Cylinders are Misfire: DTC P0300
Cylinder #1 is Misfire: DTC P0301
Cylinder #2 is Misfire: DTC P0302
Cylinder #3 is Misfire: DTC P0303
Cylinder #4 is Misfire: DTC P0304

#### *DTC P0300, P0301, P0302, P0303, P0304*

● Inspect the following items.
Low Fuel
Spark Plugs (see Spark Plug Condition Inspection(16-43))
Stick Coils (see Stick Coil Inspection(16-41))
Fuel Pressure (see Fuel Pressure Inspection(3-18))
Fuel Injectors (see DTC P0201, P0202, P0203, P0204(17-107))
Cylinder Compression (see Cylinder Compression Measurement(5-25))
Valve Clearance (see Valve Clearance Inspection(2-31))
Intake Air System (intake air from other than standard intake route, etc.)
Engine Vacuum Synchronization (see Engine Vacuum Synchronization Inspection(2-18))
Intake Air Pressure Sensor #1 (see DTC P0105(17-63)) (see DTC P0106(17-63)) (see DTC P0107(17-64))
Intake Air Pressure Sensor #2 (see DTC P2226(17-73)) (see DTC P2227(17-73)) (see DTC P2228(17-74))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-40))
Starter Motor Clutch (visually inspect)
ECU (see ECU Power Supply Inspection(3-13))
Exhaust System (leakage, tampering)
Final Drive System (drive chain, etc.)
Fuel Quality

★Even if all checks are good, the problem still exists, replace the ECU.

## Catalytic Converter

### Catalytic Converter Inspection (Service Code 4F)

***DTC P0420***

● Inspect the following items.
Exhaust Gas Leakage
Front Oxygen Sensor
Rear Oxygen Sensor

★If the above items are good, replace the exhaust pipe.

★If replacing the exhaust pipe, but the problem still exists, replace the ECU.

## Stick Coil

### Stick Coil Inspection (Service Code 51, 52, 53, 54)

Stick Coil #1: Service Code 51 (DTC P0351)
Stick Coil #2: Service Code 52 (DTC P0352)
Stick Coil #3: Service Code 53 (DTC P0353)
Stick Coil #4: Service Code 54 (DTC P0354)

#### *Stick Coil Removal*

- Refer to the Stick Coil Removal (see Stick Coil Removal(16-41)).

#### *Stick Coil Installation*

- Refer to the Stick Coil Installation (see Stick Coil Installation(16-41)).

#### *DTC P0351, P0352, P0353, P0354*

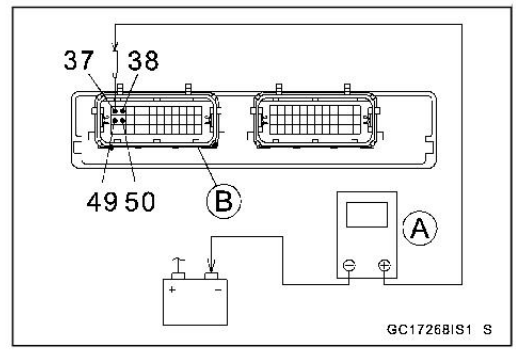
**Stick Coil Primary Winding Resistance Inspection**

- Refer to the Stick Coil Inspection (see Stick Coil Inspection(16-41)).

★If the reading is within the standard, check the input voltage.

## Stick Coil

### Stick Coil Input Voltage Inspection




**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove the ECU (see ECU Removal(3-12)).

○Do not disconnect the ECU connectors.

- Connect a digital meter [A] to the connector [B] with the needle adapter set.

**Special Tool - Needle Adapter Set: 57001-1874**

**Stick Coil Input Voltage**
**Connections to ECU Connector:**
**For Stick Coil #1**
**Digital Meter (+) → BK lead (ECU terminal 37)**
**Digital Meter (–) → Battery (–) Terminal**
**For Stick Coil #2**
**Digital Meter (+) → BK/R lead (ECU terminal 49)**
**Digital Meter (–) → Battery (–) Terminal**
**For Stick Coil #3**
**Digital Meter (+) → BK/O lead (ECU terminal 38)**
**Digital Meter (–) → Battery (–) Terminal**
**For Stick Coil #4**
**Digital Meter (+) → BK/G lead (ECU terminal 50)**
**Digital Meter (–) → Battery (–) Terminal**

- Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
- Turn the engine stop switch to run position.
- Turn the ignition switch on.

**Input Voltage**
**Standard: Battery Voltage**

- Turn the ignition switch off.

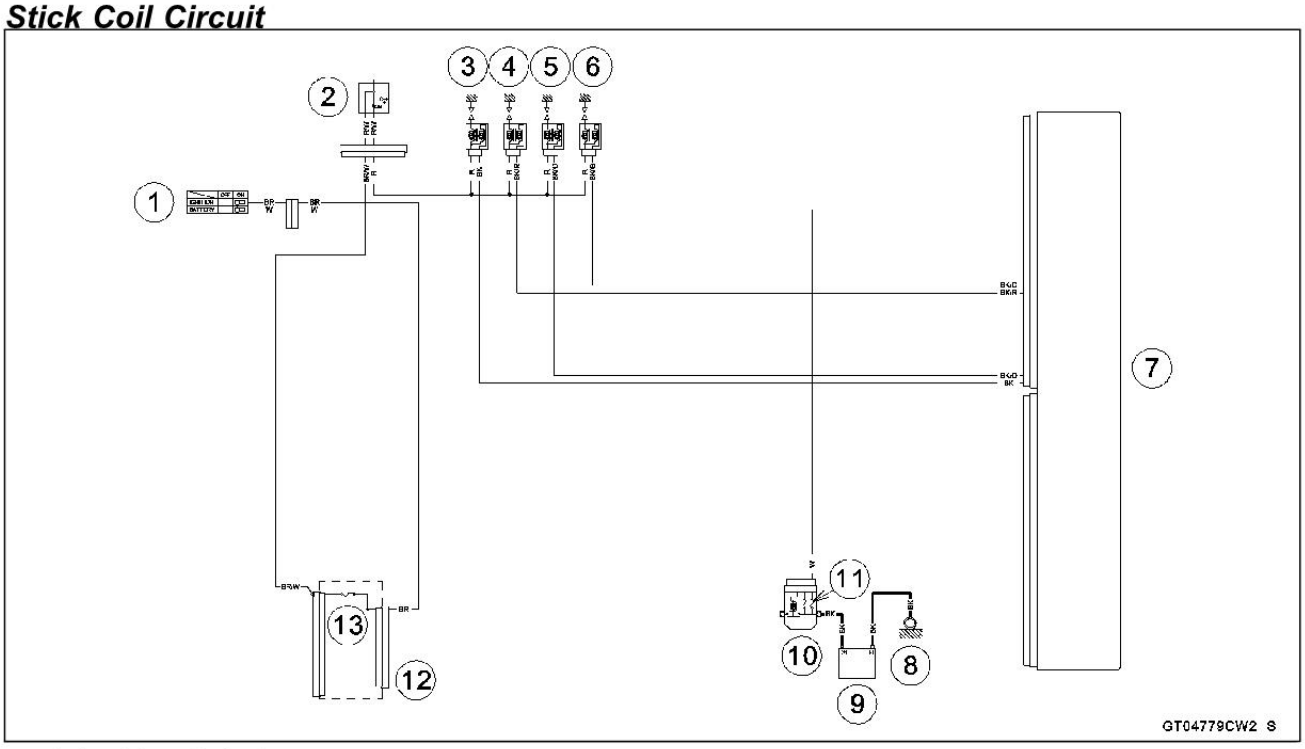
★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit(17-116)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

## Stick Coil

### *Stick Coil Circuit*

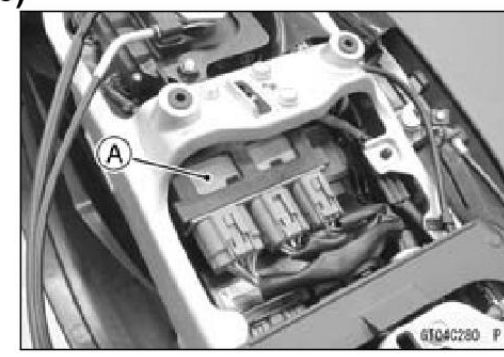



1. Ignition Switch
2. Engine Stop Switch
3. Stick Coil #1
4. Stick Coil #2
5. Stick Coil #3
6. Stick Coil #4
7. ECU
8. Engine Ground
9. Battery
10. Stater Relay
11. Main Fuse 30 A
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Radiator Fan Relay

### Radiator Fan Relay Inspection (Service Code 56)

#### *Radiator Fan Relay Removal*




○The radiator fan relay is built in the relay box [A].

- Refer to the Relay Box Removal (see Relay Box Removal(16-101)).

#### *DTC P0480*

- Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-101)).

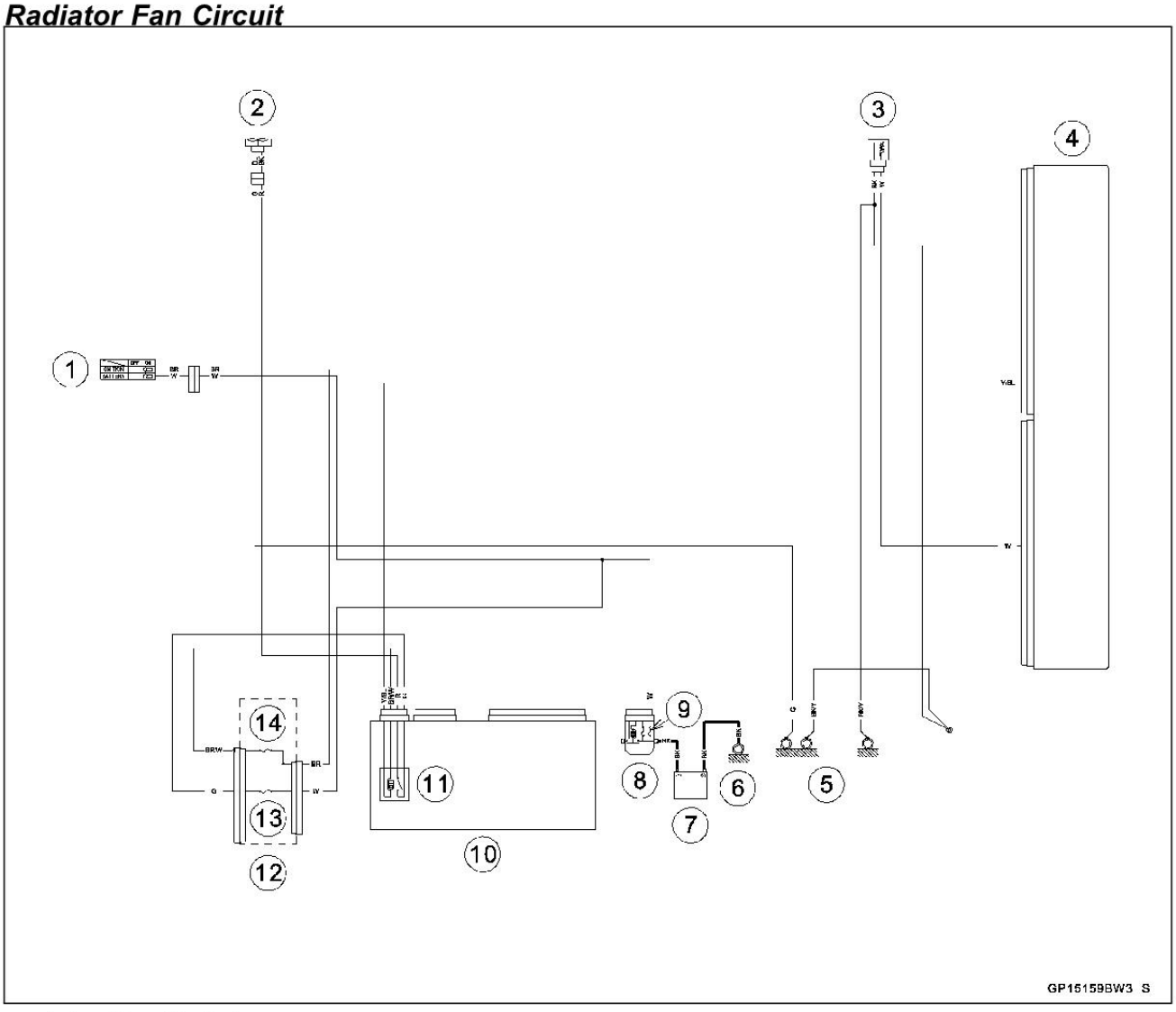
★If the radiator fan relay is normal, check the wiring for continuity (see Radiator Fan Circuit(17-118)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

## Radiator Fan Relay

### *Radiator Fan Circuit*




1. Ignition Switch
2. Radiator Fan Motor
3. Water Temperature Sensor
4. ECU
5. Frame Grounds
6. Engine Ground
7. Battery
8. Starter Relay
9. Main Fuse 30 A
10. Relay Box
11. Radiator Fan Relay
12. Fuse Box (1)
13. Radiator Fan Fuse 15 A
14. Ignition Fuse 15 A

## Rear Oxygen Sensor (Equipped Models)

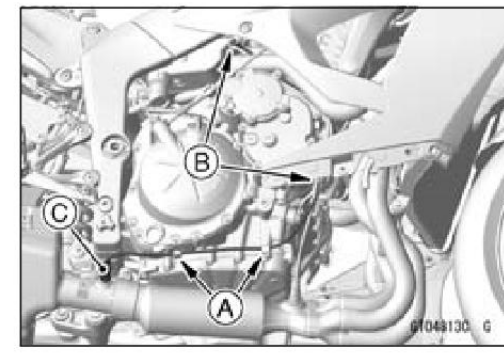
### Rear Oxygen Sensor Inspection (Service Code 5C)

#### *Rear Oxygen Sensor Removal*

| *NOTICE* |
| --- |
| **Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.** |

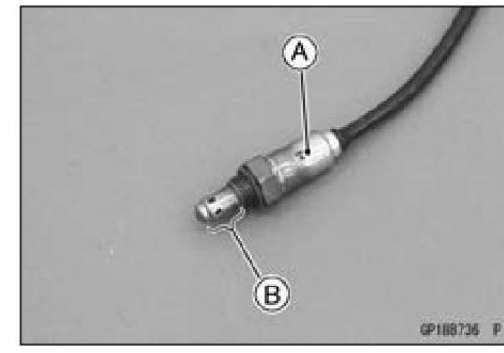
| *NOTICE* |
| --- |
| **Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.** |

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
  Right Lower Fairing (see Lower Fairing Removal(15-9))
  Premuffler Chamber Guard (see Premuffler Chamber Removal(5-38))
- Disconnect:
  Rear Oxygen Sensor Connector [A]




- Open the clamp [A].
- Clear the rear oxygen sensor lead from the clamps [B].
- Remove:
  Rear Oxygen Sensor [C]

#### *Rear Oxygen Sensor Installation*




| *NOTICE* |
| --- |
| **Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.** |

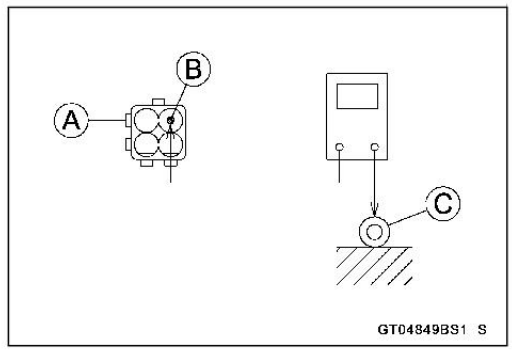
- Tighten:

  **Torque - Rear Oxygen Sensor: 25 N·m (2.5 kgf·m, 18 ft·lb)**

- Run the rear oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

## Rear Oxygen Sensor (Equipped Models)

### *DTC P0136*

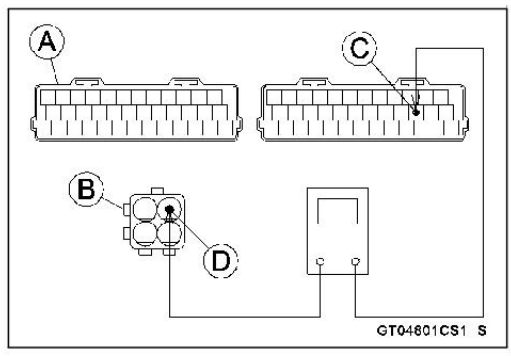



(Checking wire for short circuit to ground)

- Disconnect:
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**GY/BK lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



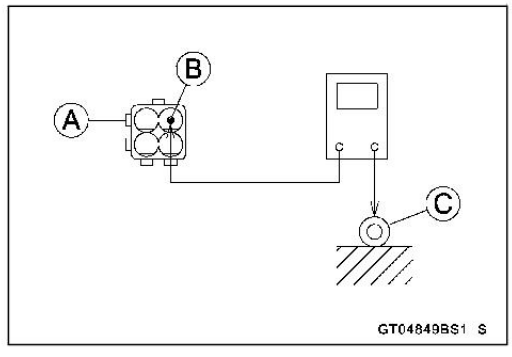

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Rear Oxygen Sensor Connector [B]**
**ECU Terminal 15 [C] ←→ Sensor Terminal [D]**

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the rear oxygen sensor (see Rear Oxygen Sensor Circuit(17-121)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the rear oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P0138*




(Checking wire for short circuit to power supply wire)

- Disconnect:
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Sensor Connector:**
**Digital Meter (+) → GY/BK lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the rear oxygen sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

## Rear Oxygen Sensor (Equipped Models)

### *DTC P2A01*

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Check the terminals of the sensor and ECU for corrosion or bent.

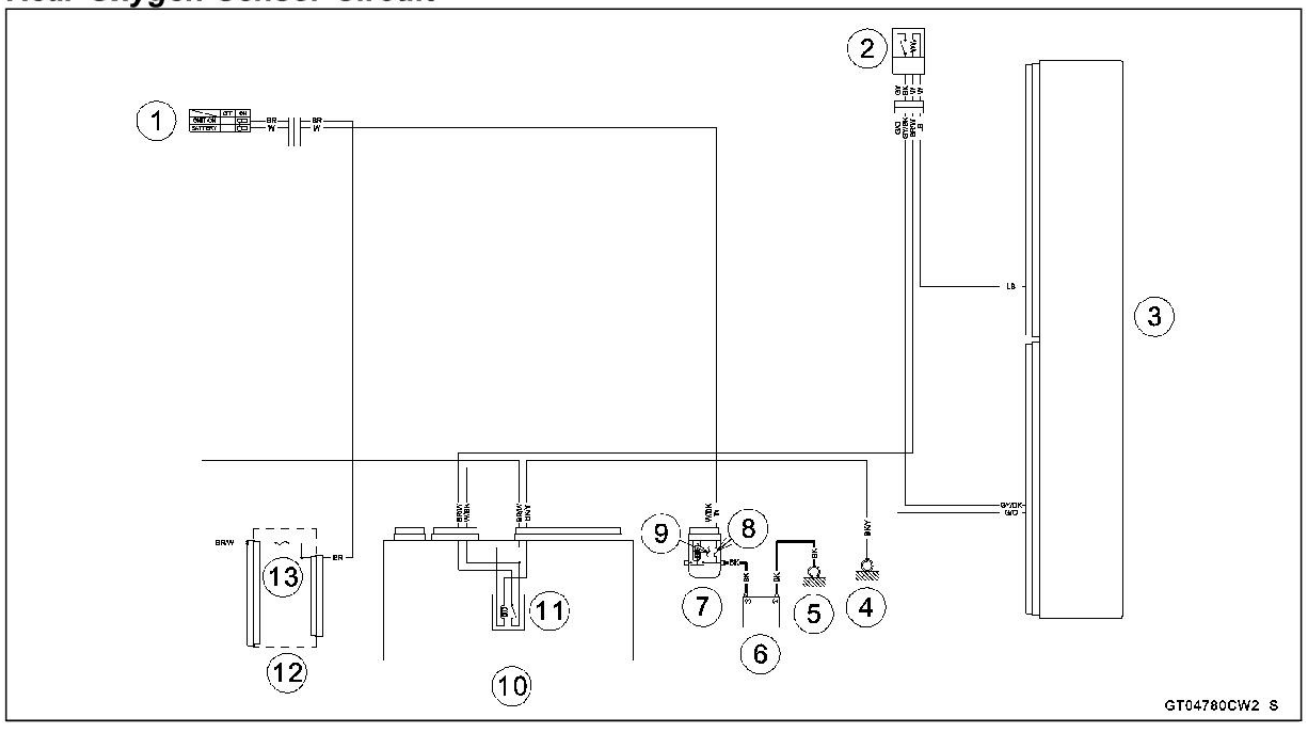
★If the terminals are corroded or bent, replace the rear oxygen sensor and/or ECU.

★If the terminals are good, check the rear oxygen sensor wirings (see Rear Oxygen Sensor Circuit(17-121)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

### *Rear Oxygen Sensor Circuit*




1. Ignition Switch
2. Rear Oxygen Sensor
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Rear Oxygen Sensor Heater (Equipped Models)

## Rear Oxygen Sensor Heater Inspection (Service Code 5D)

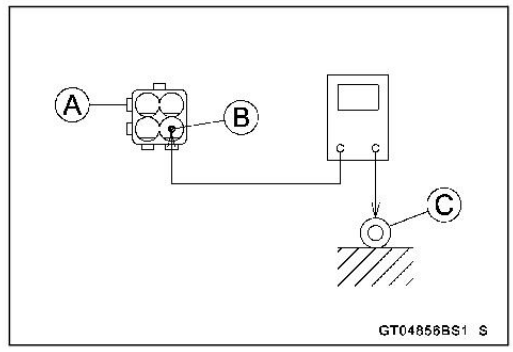
### *Rear Oxygen Sensor Heater Removal*

- The oxygen sensor heater is built in the oxygen sensor. So, the heater itself can not be removed. Remove the rear oxygen sensor (see Rear Oxygen Sensor Removal(17-119)).

### *DTC P0036*

(Checking wire for short circuit to ground)

- Disconnect:
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

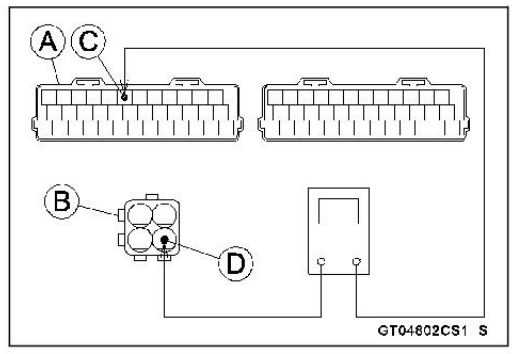



**Wiring Continuity Inspection**
**LB lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.




**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Rear Oxygen Sensor Connector [B]**
**ECU Terminal 43 [C] ←→ Sensor Terminal [D]**

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the other wirings of the rear oxygen sensor (see Rear Oxygen Sensor Circuit(17-125)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the rear oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

## Rear Oxygen Sensor Heater (Equipped Models)

### *DTC P0038*

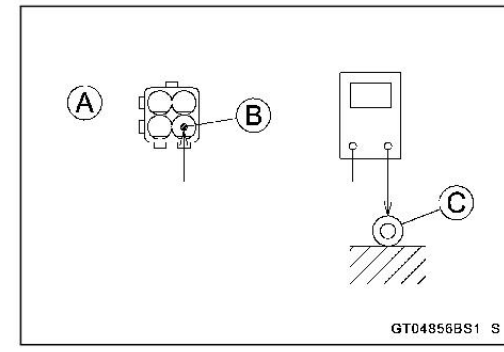
(Checking wire for short circuit to power supply wire)

- Disconnect:
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Sensor Connector:**
**Digital Meter (+) → LB lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

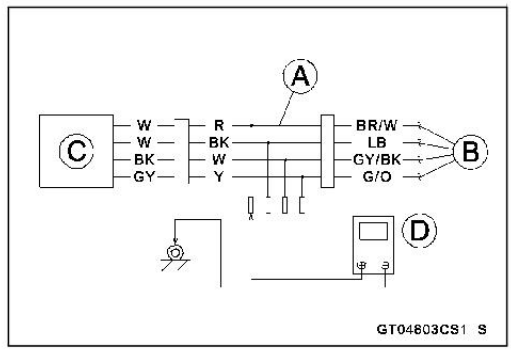
- Measure the voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the rear oxygen sensor.
★Even if all checks are good, the problem still exists, replace the ECU.



## Rear Oxygen Sensor Heater (Equipped Models)

### *DTC P0054*




**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect:
  Rear Oxygen Sensor Connector (see Rear Oxygen Sensor Removal(17-119))
- Connect the measuring adapter [A] to the rear oxygen sensor connectors as shown.
  Main Harness [B]
  Rear Oxygen Sensor [C]

**Special Tool - Measuring Adapter: 57001-1700**

- Connect a digital meter [D] to the measuring adapter leads.

**Rear Oxygen Sensor Power Source Voltage**
**Connection to Adapter:**
**Digital Meter (+) → R (main harness BR/W) lead**
**Digital Meter (–) → Frame Ground Terminal**

- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

**Power Source Voltage**
**Standard: Battery Voltage**

- Turn the ignition switch off.

★If the reading is out of the standard, check the following.
ECU Fuse 15 A (see Fuse Inspection(16-106))
Power Source Wiring (see Rear Oxygen Sensor Circuit(17-125))

★If the fuse and wiring are good, check the terminals of the sensor and ECU for corrosion or bent.

○Remove:
ECU (see ECU Removal(3-12))

★If the terminals are corroded or bent, replace the rear oxygen sensor and/or ECU.

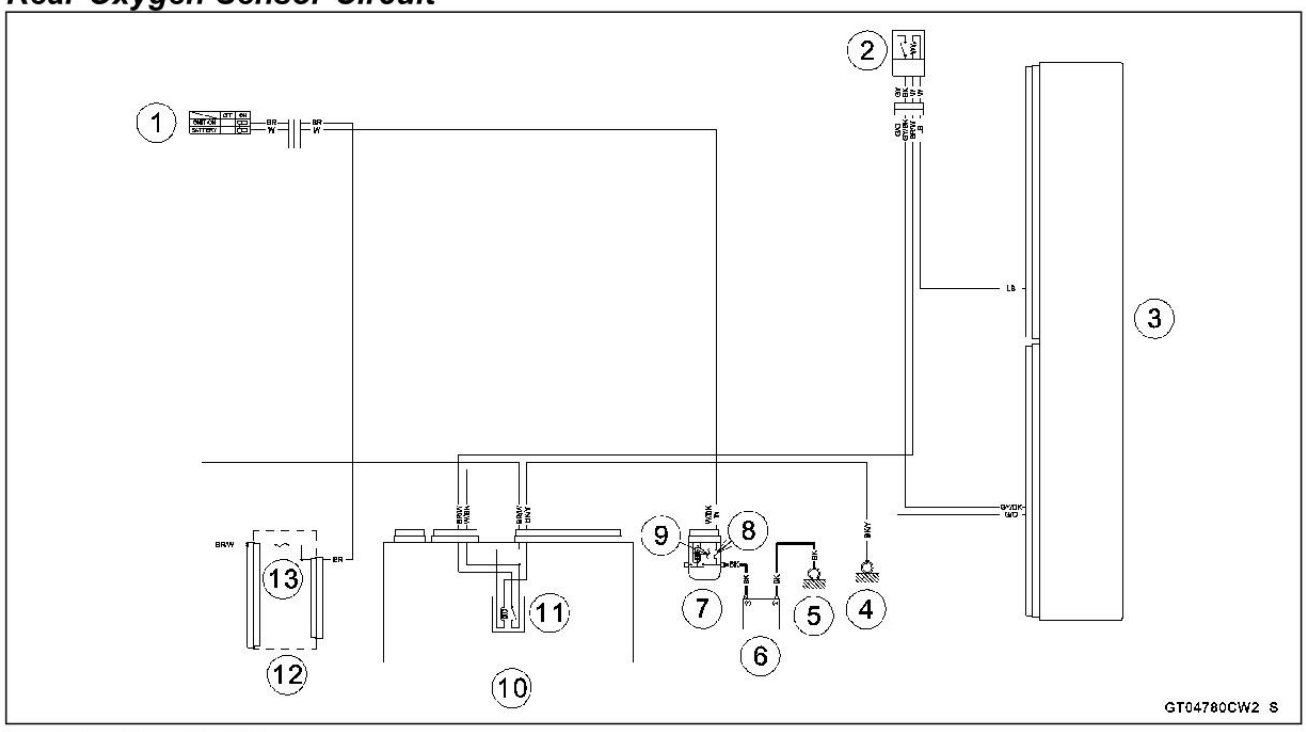
★If the terminals are good, check the other wirings of the rear oxygen sensor (see Rear Oxygen Sensor Circuit(17-125)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

## Rear Oxygen Sensor Heater (Equipped Models)

### *Rear Oxygen Sensor Circuit*




1. Ignition Switch
2. Rear Oxygen Sensor
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Subthrottle Valve Actuator

## Subthrottle Valve Actuator Inspection (Service Code 62)

### *Subthrottle Valve Actuator Removal*

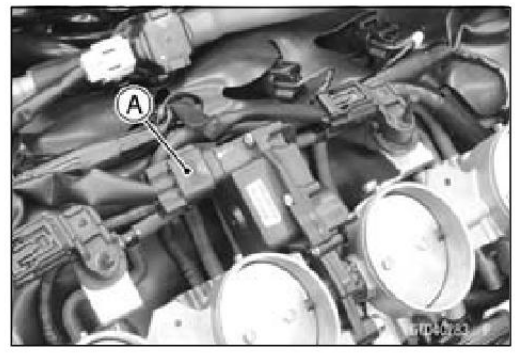
***NOTICE***

**Do not remove the subthrottle valve actuator [A] since it has been adjusted and set with precision at the factory.**
**Never drop the throttle body assy especially on a hard surface. Such a shock to the subthrottle valve actuator can damage it.**

### *DTC P2100*

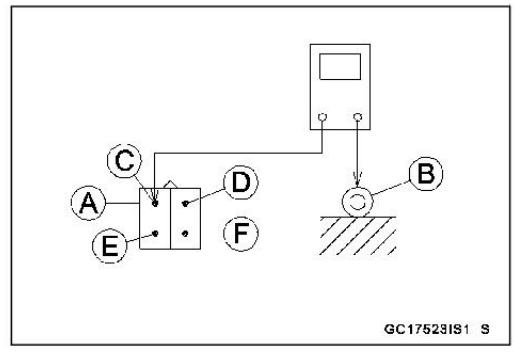
(Checking wire for short circuit to ground)

- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-33)).
- Disconnect:
  Subthrottle Valve Actuator Connector [A]




- Check the wiring for short circuit to ground by checking continuity between the subthrottle valve actuator connector [A] and frame ground terminal [B].

**Wiring Continuity Inspection**
**(1) P/BL lead [C] ←→ Frame Ground**
**(2) Y/BK lead [D] ←→ Frame Ground**
**(3) BK/O lead [E] ←→ Frame Ground**
**(4) G lead [F] ←→ Frame Ground**

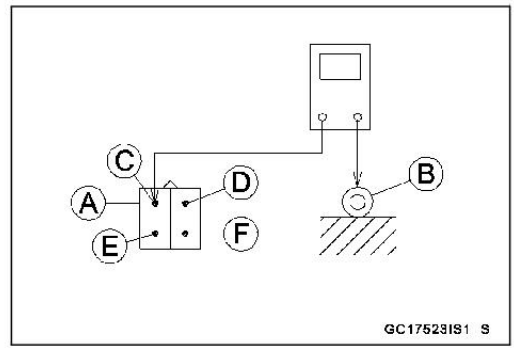



★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

(Checking wire for short circuit to power supply wire)

- Connect the digital meter to the connector [A] and frame ground terminal [B].

**Measuring Voltage**
**Connection to Actuator Connector:**
**(1) Digital Meter (+) → P/BL lead [C]**
**Digital Meter (–) → Frame Ground**
**(2) Digital Meter (+) → Y/BK lead [D]**
**Digital Meter (–) → Frame Ground**
**(3) Digital Meter (+) → BK/O lead [E]**
**Digital Meter (–) → Frame Ground**
**(4) Digital Meter (+) → G lead [F]**
**Digital Meter (–) → Frame Ground**

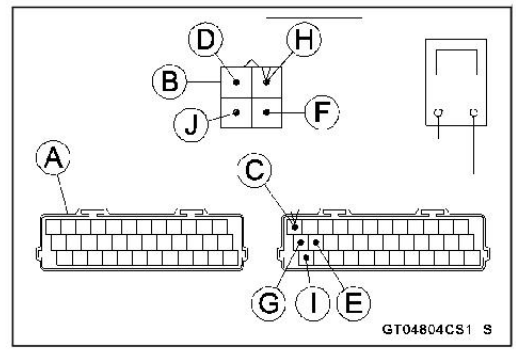



- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, go to next check.

## Subthrottle Valve Actuator

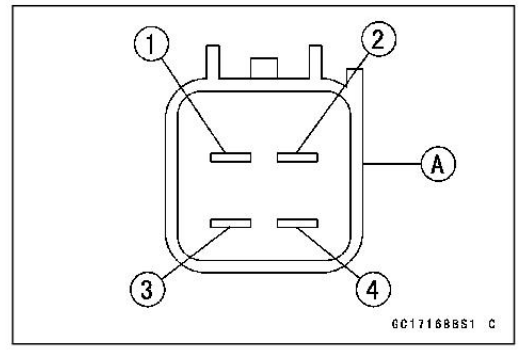
(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between the ECU harness connector and actuator connector.




**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Subthrottle Valve Actuator Connector [B]**
**ECU Terminal 12 [C] ←→ Actuator Terminal [D]**
**ECU Terminal 23 [E] ←→ Actuator Terminal [F]**
**ECU Terminal 24 [G] ←→ Actuator Terminal [H]**
**ECU Terminal 36 [I] ←→ Actuator Terminal [J]**

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next check.

(Checking sensor for internal short circuit)
- Connect a digital meter to the subthrottle valve actuator connector [A].
- Measure the subthrottle valve actuator resistance.

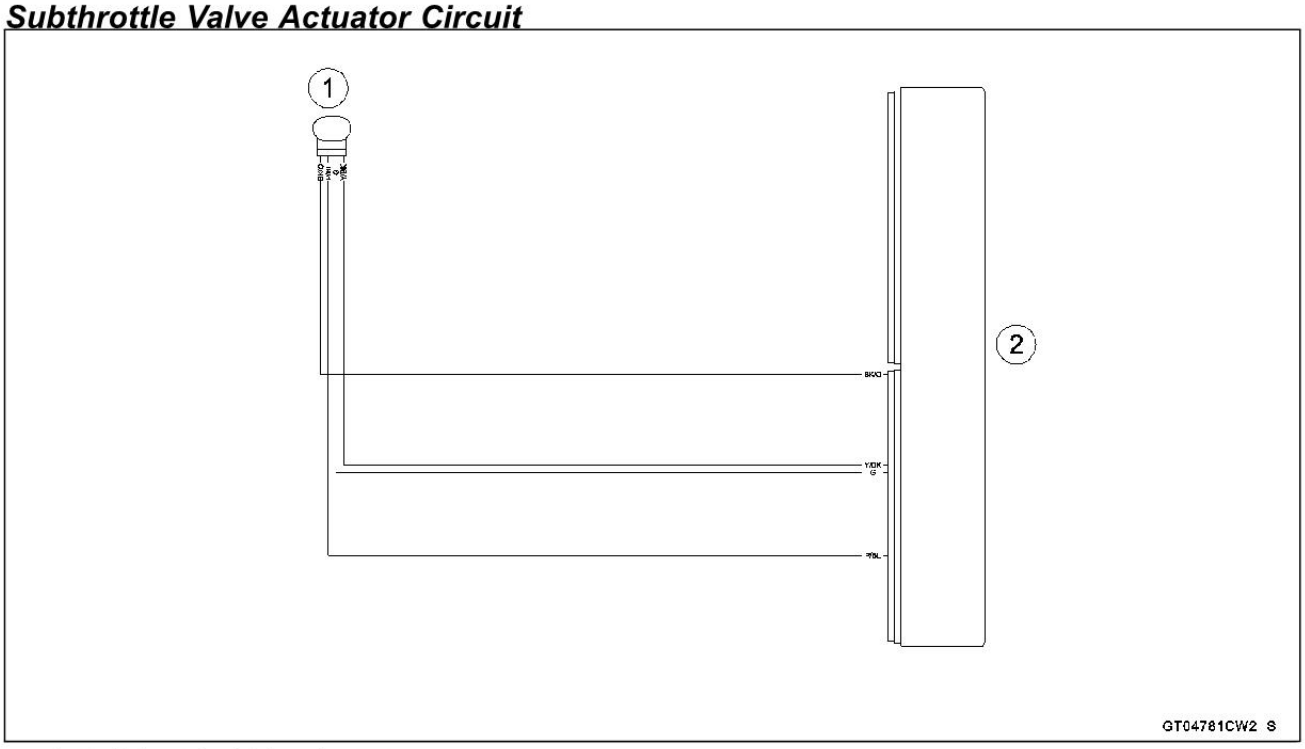



**Subthrottle Valve Actuator Resistance**
**Connections:** **Y/BK lead [1] ←→ P/BL lead [2]**
**G lead [3] ←→ BK/O lead [4]**
**Standard:** **About 5.2 – 7.8 Ω**

★If the reading is out of the standard, replace the throttle body assy.
★If the reading is within the standard, check the terminals of the actuator and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the throttle body assy and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

## Subthrottle Valve Actuator

### *Subthrottle Valve Actuator Circuit*




1. Subthrottle Valve Actuator
2. ECU

## Exhaust Butterfly Valve Actuator

### Exhaust Butterfly Valve Actuator Inspection (Service Code 63)

#### *Exhaust Butterfly Valve Actuator Removal*

● Refer to the Exhaust Butterfly Valve Actuator Removal (see Exhaust Butterfly Valve Actuator Removal(5-46)).

#### *Exhaust Butterfly Valve Actuator Installation*

● Refer to the Exhaust Butterfly Valve Actuator Installation (see Exhaust Butterfly Valve Actuator Installation(5-47)).

#### *DTC P0475*

**Exhaust Butterfly Valve Actuator Operation Inspection**

**NOTE**

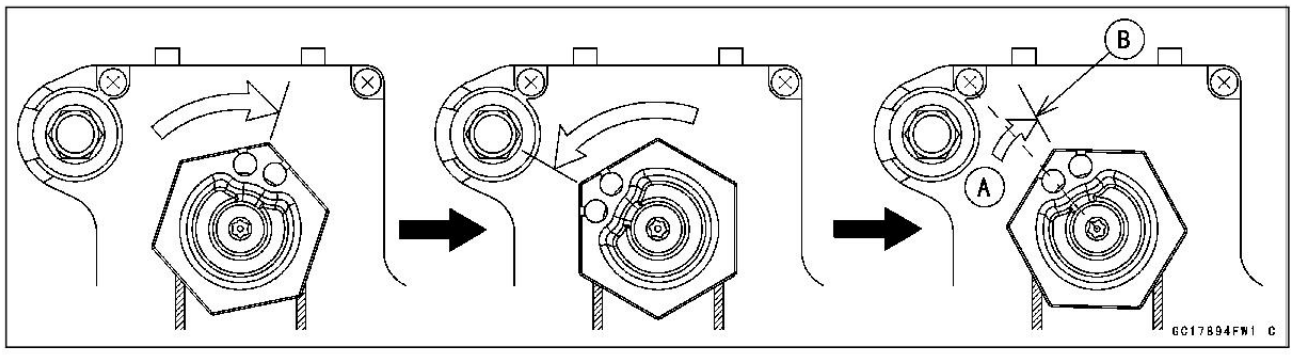
○*Be sure the battery is fully charged.*

● Remove:
Rear Seat (see Rear Seat Removal(15-8))
● Turn the ignition switch on.
● Make sure that the pulley turns clockwise, then counterclockwise and then returns slightly clockwise [A] as shown.

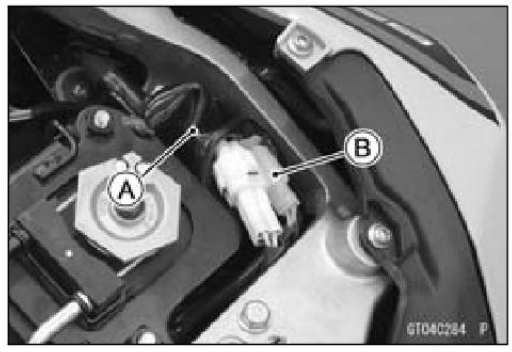
**NOTE**

○*The stop position [B] of the pulley is changed by the cables tension and the closed position of the exhaust butterfly valve.*

● Turn the ignition switch off.
★ If the pulley does not operate, check the exhaust butterfly valve actuator resistance.



## Exhaust Butterfly Valve Actuator




**Exhaust Butterfly Valve Actuator Resistance Inspection**

- Turn the ignition switch off.
- Remove:
  Rear Seat (see Rear Seat Removal(15-8))
- Slide the dust cover [A].
- Disconnect:
  Exhaust Butterfly Valve Actuator Connector (2 Pins) [B]
- Connect a digital meter to the exhaust butterfly valve actuator connector.
- Measure the exhaust butterfly valve actuator resistance.

**Exhaust Butterfly Valve Actuator Resistance**

| | |
|---|---|
| **Connections:** | **P lead ←→ GY lead** |
| **Standard:** | **5 – 200 Ω (for reference)** |

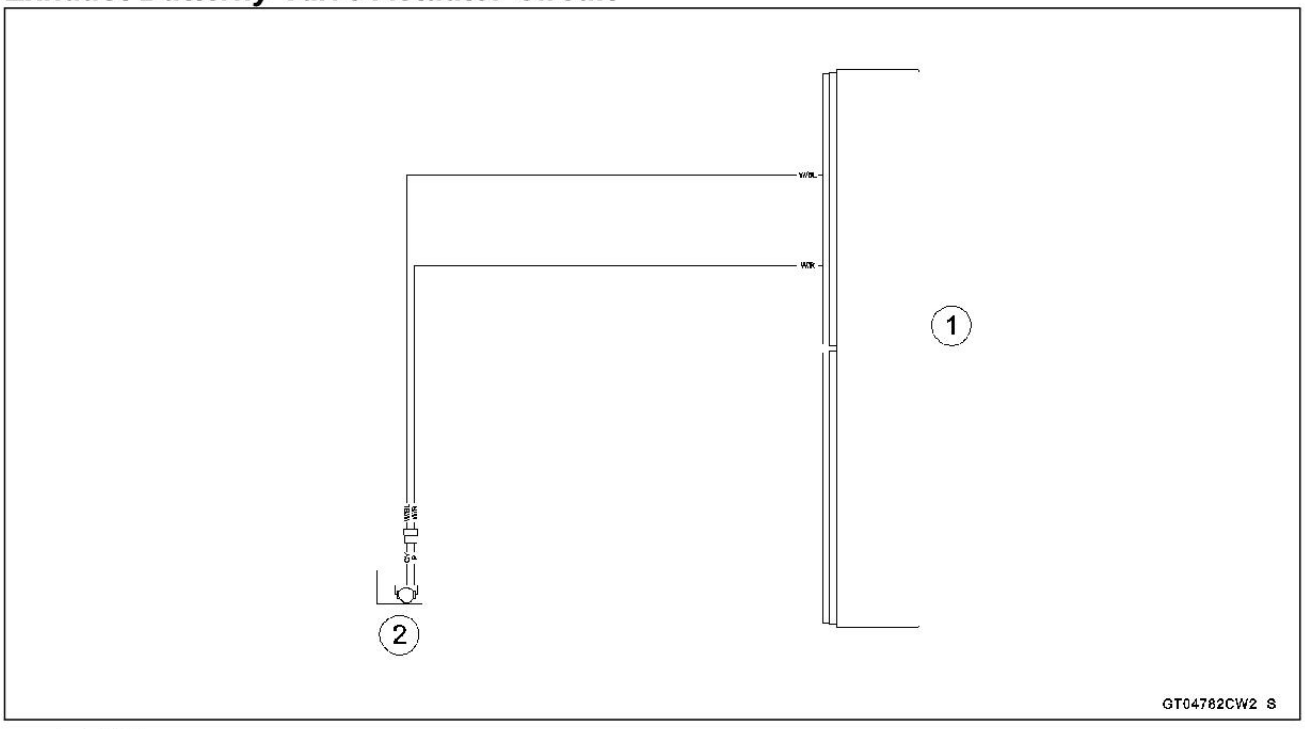
★If the reading is 0 or infinity (∞) Ω, replace the exhaust butterfly valve actuator.

★If the reading is within the standard, check the wiring for continuity (see Exhaust Butterfly Valve Actuator Circuit(17-130)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

### *Exhaust Butterfly Valve Actuator Circuit*




1. ECU
2. Exhaust Butterfly Valve Actuator

## Air Switching Valve

## Air Switching Valve Inspection (Service Code 64)

### *Air Switching Valve Removal*

- Refer to the Air Switching Valve Removal (see Air Switching Valve Removal(5-12)).

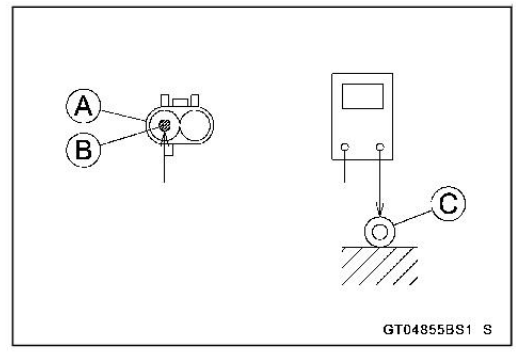
### *Air Switching Valve Installation*

- Refer to the Air Switching Valve Installation (see Air Switching Valve Installation(5-13)).

### *DTC P0418*

(Checking wire for short circuit to ground)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
- Check the wiring for short circuit to ground by checking continuity between the valve connector [A] and frame ground terminal.



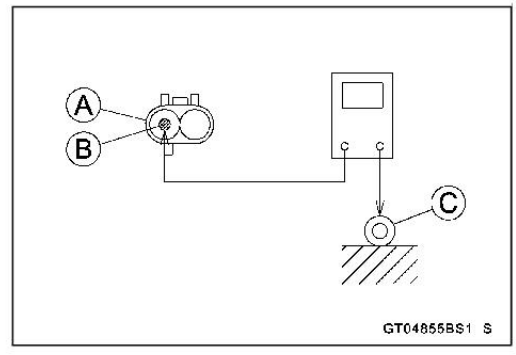

**Wiring Continuity Inspection**
**R/BL lead [B] ←→ Frame Ground Terminal [C]**

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the air switching valve.
★Even if all checks are good, the problem still exists, replace the ECU.

### *DTC P2258*

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
- Connect the digital meter to the valve connector [A].



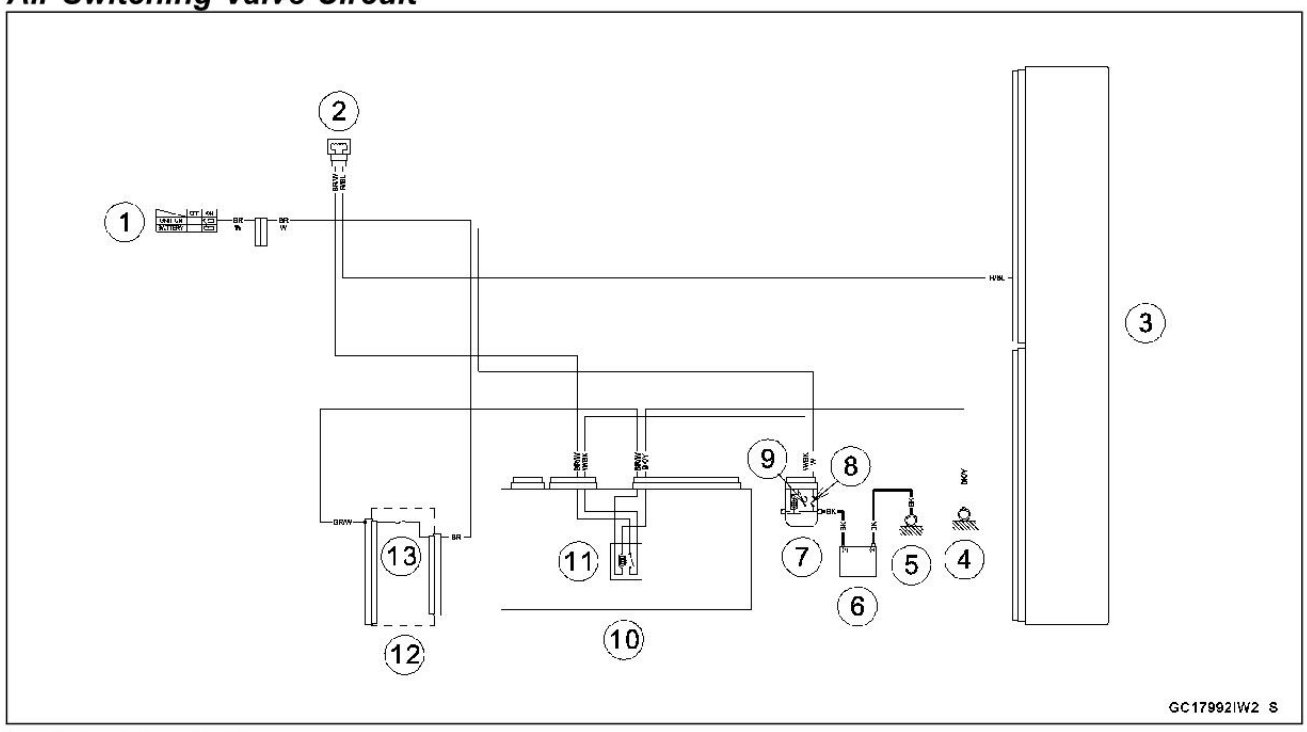

**Measuring Voltage**
**Connection to Valve Connector:**
**Digital Meter (+) → R/BL lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

- Measure the measuring voltage.
- Turn the ignition switch on

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the air switching valve.
★Even if all checks are good, the problem still exists, replace the ECU.

## Air Switching Valve

### *Air Switching Valve Circuit*




1. Ignition Switch
2. Air Switching Valve
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Front Oxygen Sensor Heater

### Front Oxygen Sensor Heater Inspection (Service Code 67)

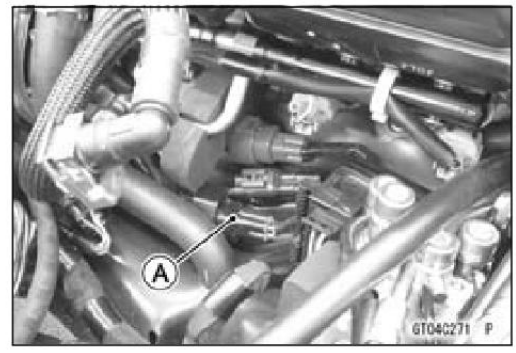
#### *Front Oxygen Sensor Heater Removal*

The front oxygen sensor heater is built in the front oxygen sensor. So, the heater itself can not be removed. Remove the front oxygen sensor.

#### *DTC P0030*

(Checking wire for short circuit to ground)

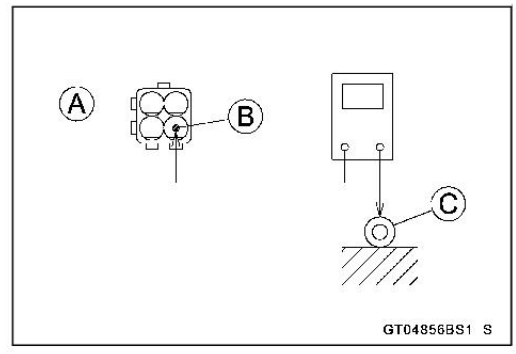
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Front Oxygen Sensor Connector [A]




- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

**Wiring Continuity Inspection**
**P/BK lead [B] ←→ Frame Ground Terminal [C]**

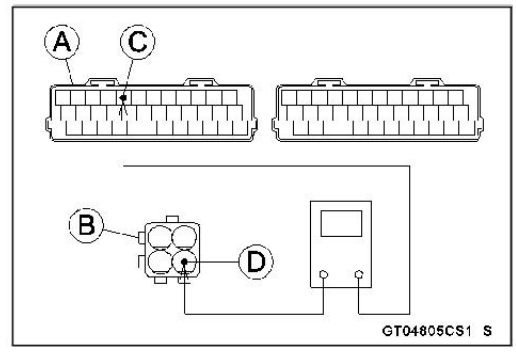
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.




(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

**Wiring Continuity Inspection**
**Wiring Continuity Inspection**
**ECU Connector [A] ←→**
**Front Oxygen Sensor Connector [B]**
**ECU Terminal 44 [C] ←→ Sensor Terminal [D]**



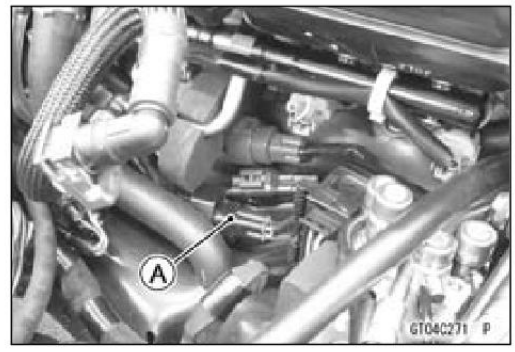

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check other wirings of the front oxygen sensor (see Front Oxygen Sensor Circuit(17-136)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

## Front Oxygen Sensor Heater

### *DTC P0032*

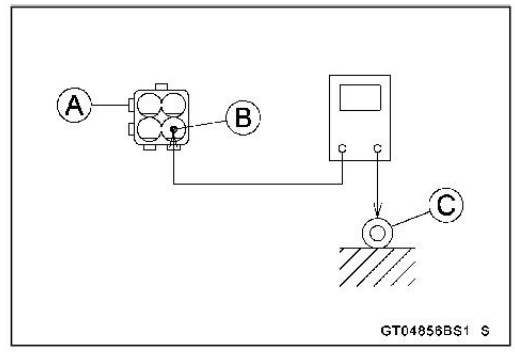
(Checking wire for short circuit to power supply wire)

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect:
  Front Oxygen Sensor Connector [A]




- Connect the digital meter to the connector [A].

**Measuring Voltage**
**Connection to Senor Connector:**
**Digital Meter (+) → P/BK lead [B]**
**Digital Meter (–) → Frame Ground Terminal [C]**

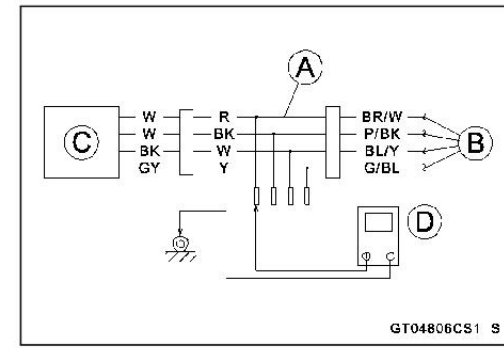



- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the front oxygen sensor.
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

## Front Oxygen Sensor Heater

### *DTC P0053*




**NOTE**

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-38))
- Disconnect the front oxygen sensor connector and connect the measuring adapter [A] between these connectors.
  Main Harness [B]
  Front Oxygen Sensor [C]

**Special Tool - Measuring Adapter: 57001-1700**

- Connect a digital meter [D] to the measuring adapter lead.

**Oxygen Sensor Power Source Voltage**
**Connections to Adapter:**
**Digital Meter (+) → R (main harness BR/W) lead**
**Digital Meter (–) → Frame Ground Terminal**

- Measure the power source voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

**Power Source Voltage**
**Standard: Battery Voltage**

- Turn the ignition switch off.

★If the reading is out of the standard, check the following.
ECU Fuse 15 A (see Fuse Inspection(16-106))
Power Source Wiring (see Front Oxygen Sensor Circuit(17-136))

★If the reading is specification, check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.

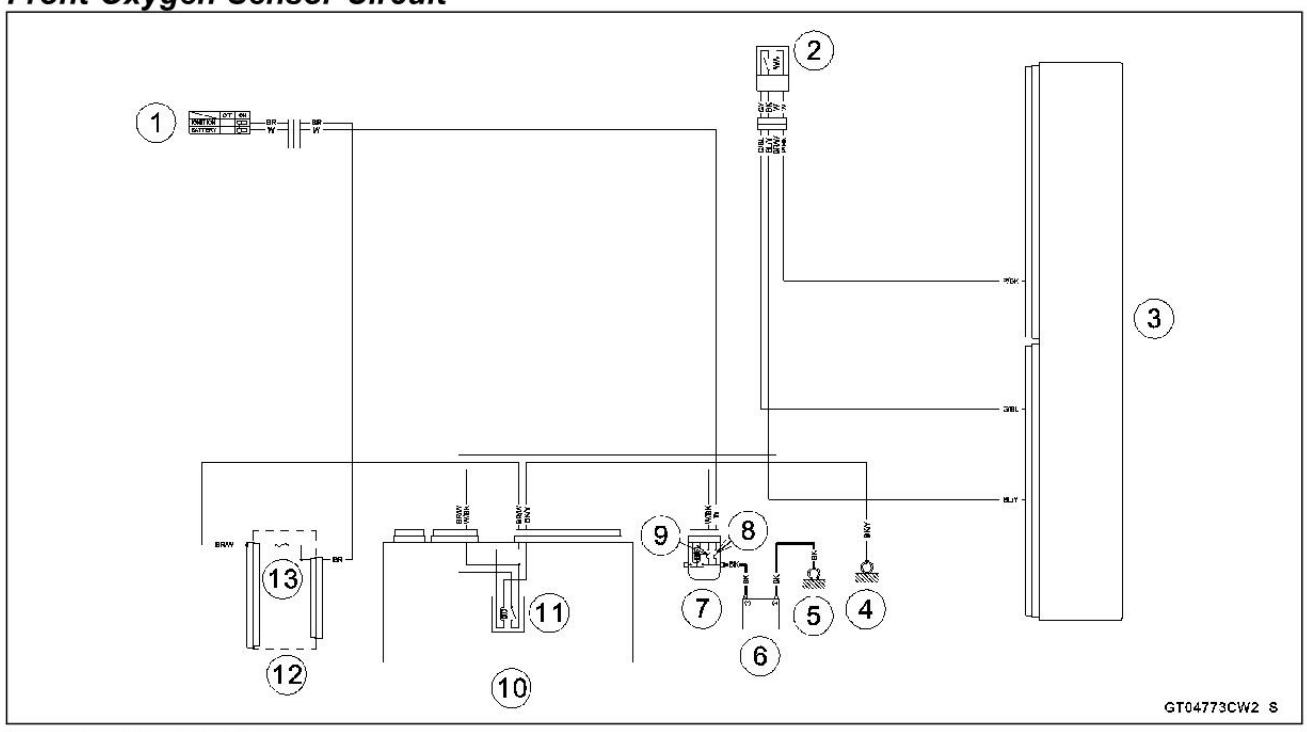
★If the terminals are good, check the other wirings of the front oxygen sensor (see Front Oxygen Sensor Circuit(17-136)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

## Front Oxygen Sensor Heater

### *Front Oxygen Sensor Circuit*




1. Ignition Switch
2. Front Oxygen Sensor
3. ECU
4. Frame Ground
5. Engine Ground
6. Battery
7. Starter Relay
8. Main Fuse 30 A
9. ECU Fuse 15 A
10. Relay Box
11. ECU Main Relay
12. Fuse Box (1)
13. Ignition Fuse 15 A

## Starter Lockout Switch

### Starter Lockout Switch Inspection (Service Code 6D)

***DTC P0704***

- Inspect the starter lockout switch (see Switch Inspection(16-98)).

★If the starter lockout switch is bad condition, replace it.

★If the starter lockout switch is good condition, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

### *Solenoid Valve Inspection (Service Code 13, 14, 17, 18)*

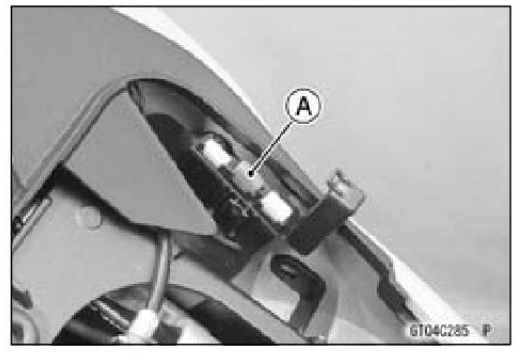
- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the solenoid valve in the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *ABS Solenoid Valve Relay Inspection (Service Code 19)*

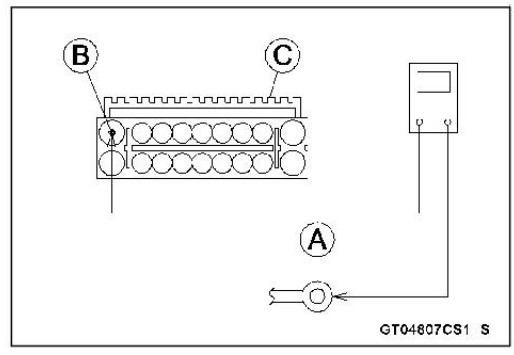
- Remove:
  Front Seat (see Front Seat Removal(15-8))
- Check the ABS solenoid valve relay fuse (15 A) [A] (see Fuse Inspection(16-106)).




★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/BK lead terminal [B] in the ABS hydraulic unit connector [C].

★If there is not the continuity in the lead, replace or repair the main harness.

★If there is the continuity in the lead, go to next step.




- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

## Anti-Lock Brake System

### *Front, Rear Tire Abnormal Inspection (Service Code 25)*

- Check the following and correct the faulty part.
  Incorrect Tire Pressure
  Tires not recommended for the motorcycle were installed (incorrect tire size).
  Deformation of Wheel or Tire
  Missing Teeth and Clogging with Foreign Matter of Sensor Rotor (see Wheel Rotation Sensor Rotor Inspection(12-35))

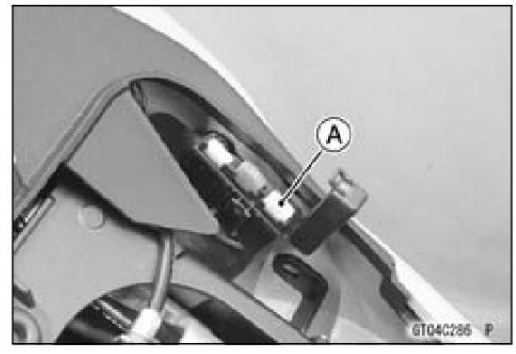
★If the all parts correct, recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *ABS Motor Relay Inspection (Service Code 35)*

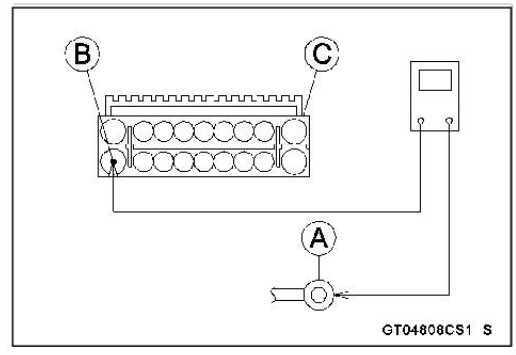
- Remove:
  Front Seat (see Front Seat Removal(15-8))
- Check the ABS motor relay fuse (25 A) [A] (see Fuse Inspection(16-106)).




★If the fuse is good, check the wiring continuity between the positive (+) terminal [A] of the battery and R/W lead terminal [B] in the ABS hydraulic unit connector [C].

★If there is not the continuity in the lead, replace or repair the main harness.

★If there is the continuity in the lead, go to next step.




- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Front Wheel Rotation Sensor Signal Abnormal Inspection (Service Code 42)*

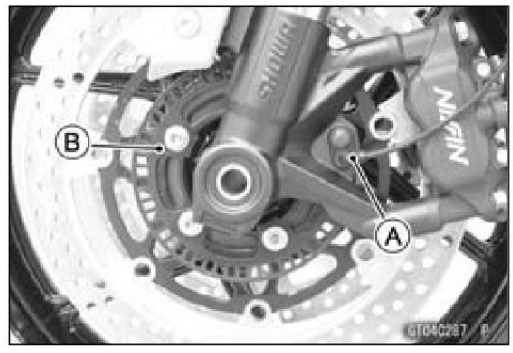
- Measure the air gap between the front wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Check the front wheel rotation sensor (see Wheel Rotation Sensor Inspection(12-34)).

★If both inspections are good, go to next step.

- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★If the sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.

★If the all items are good, go to next step.




- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

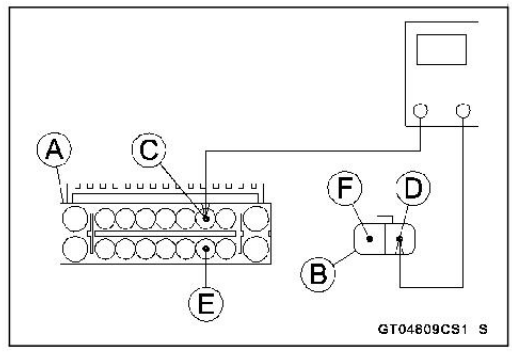
### *Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)*

- Disconnect:
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-30))
  Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal(12-32))

- Check the wiring continuity of the BK/W lead and W/BK lead.

**Wiring Continuity Inspection**

| | | |
|---|---|---|
| **ABS Hydraulic Unit Connector [A]** | ←→ | **Front Wheel Rotation Sensor Connector [B]** |
| **ABS Hydraulic Unit Terminal 3 [C]** | ←→ | **Sensor Terminal [D]** |
| **ABS Hydraulic Unit Terminal 12 [E]** | ←→ | **Sensor Terminal [F]** |




★If there is not the continuity in the lead, replace or repair the main harness.

★If the wiring is good, go to next step.

## Anti-Lock Brake System

- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★ If the yellow ABS indicator light goes on, replace the front wheel rotation sensor.

★ Still, when it is not good, replace the ABS hydraulic unit.

★ If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Rear Wheel Rotation Sensor Signal Abnormal Inspection (Service Code 44)*

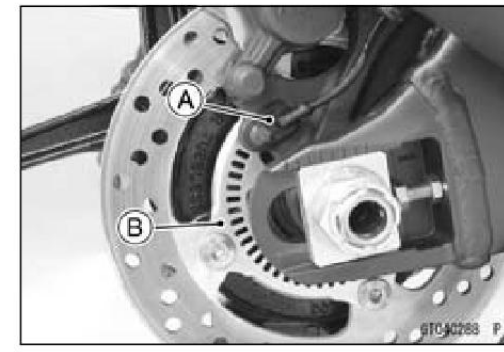
- Measure the air gap between the rear wheel rotation sensor and sensor rotor (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Check the rear wheel rotation sensor (see Wheel Rotation Sensor Inspection(12-34)).

★ If both inspections are good, go to next step.

- Check that there is iron or other magnetic deposits between the sensor [A] and sensor rotor [B], and the sensor rotor slots for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor rotor tip for deformation or damage (e.g., chipped sensor rotor teeth).

★ If the sensor rotor in bad condition, remove the any deposits. Install the proper part or replace faulty part.

★ If the all items are good, go to next step.




- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★ If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★ If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)*

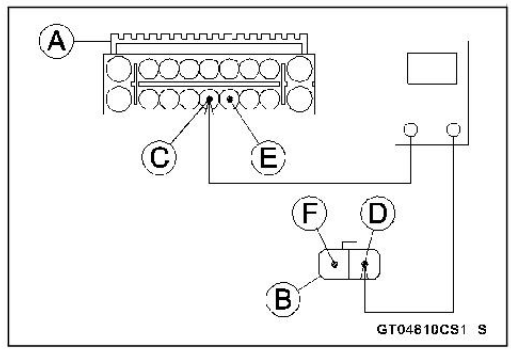
- Disconnect:
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-30))
  Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal(12-33))

## Anti-Lock Brake System

- Check the wiring continuity of the BK/O lead and W/G lead.

**Wiring Continuity Inspection**

| | | |
|---|---|---|
| **ABS Hydraulic Unit Connector [A]** | ⟷ | **Rear Wheel Rotation Sensor Connector [B]** |
| **ABS Hydraulic Unit Terminal 14 [C]** | ⟷ | **Sensor Terminal [D]** |
| **ABS Hydraulic Unit Terminal 13 [E]** | ⟷ | **Sensor Terminal [F]** |




★If there is not the continuity in the lead, replace or repair the main harness.
★If the wiring is good, go to next step.

- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, replace the rear wheel rotation sensor.
★Still, when it is not good, replace the ABS hydraulic unit.
★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Power Supply Voltage Abnormal Inspection [Low-Voltage] (Service Code 52)*

- Check the battery condition(see Charging Condition Inspection(16-29)).

★If the battery is good condition, go to next step.

- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Power Supply Voltage Abnormal Inspection [Over-Voltage] (Service Code 53)*

- Check the charging voltage (see Charging Voltage Inspection(16-34)).

★If the charging voltage is good, go to next step.

- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

## Anti-Lock Brake System

### *ABS Solenoid Valve Relay Supply Voltage Inspection [Low-Voltage] (Service Code 54)*

- Check the charging voltage (see Charging Voltage Inspection(16-34)).

★If the charging voltage is good, go to next step.

- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

### *ECU Inspection (Service Code 55)*

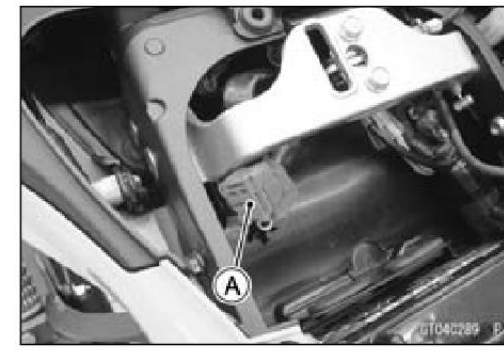
- Recheck the service code indication; erase the service code (see Service Code Erasing(17-51)), perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)), and retrieve the service code.

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator light does not go on, ABS is normal (service code is not stored; temporary failure.).

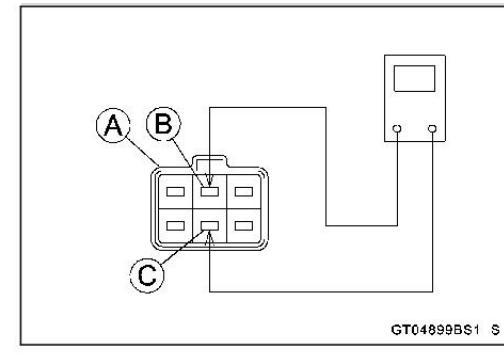
### *CAN Communication (Transmission)/CAN Bus OFF Monitor Inspection (Service Code 57)*

- Remove:
  Front Seat (see Front Seat Removal(15-8))
  Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector Cap [A]




- Measure the CAN communication line resistance.
  Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [A]
  GY/BL Terminal [B]
  LB Terminal [C]

**CAN Communication Line Resistance**
**Standard: 30 – 70 Ω**




★If the reading is out of the standard, go to Check 1.

★If the reading is the standard, go to Check 2.

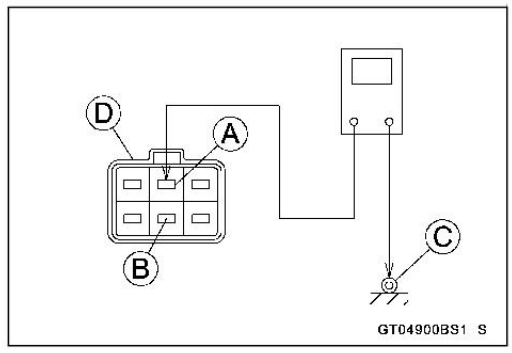
**Check 1**

- Check the CAN communication line resistance of following parts.
  ECU (see CAN Communication Line Resistance Inspection(3-16))

**Check 2**

- Measure the resistance between the GY/BL [A] or LB [B] terminal and ground [C].
  Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [D]

**CAN Communication Line/Ground Resistance**
**Standard: 4 – 30 kΩ**




★If the reading is out of the standard, replace or repair the main harness.
★If the reading is the standard, go to next step.

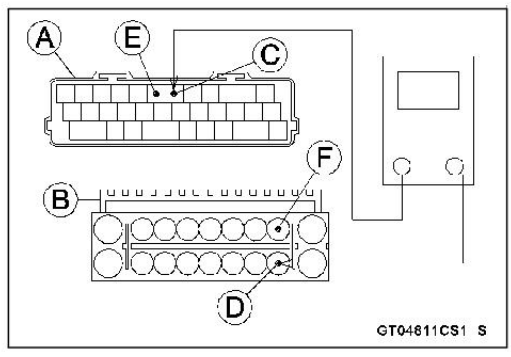
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)).

★If the yellow ABS indicator light goes on or KIBS warning message appears even if all checks are ended, replace the ABS hydraulic unit.
★If the yellow ABS indicator light goes off or KIBS warning message disappears, the KIBS is normal (temporary failure).

### *ECU Communication Line Inspection (Service Code 62)*

- Check the wiring continuity between the main harness connectors.
- Disconnect:
  ECU Connector (see ECU Removal(3-12))
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-30))

**Wiring Continuity Inspection**
**ECU Connector [A] ←→ ABS Hydraulic Unit Connector [B]**
**ECU Terminal 6 [C] ←→ ABS Hydraulic Unit Terminal 11 [D]**
**ECU Terminal 7 [E] ←→ ABS Hydraulic Unit Terminal 2 [F]**




★If the wiring is open, replace or repair the harness.
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection(3-13)).
★If the ground and power supply are good, go to next step.

- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)).

★If the yellow ABS indicator light goes on or KIBS warning message appears even if all checks are ended, replace the ABS hydraulic unit.
★If the yellow ABS indicator light goes off or KIBS warning message disappears, the KIBS is normal (temporary failure).

### *Output Fluid Pressure Sensor (Front Brake) Wiring Inspection (Service Code 83)*

- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)).

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.
★If the yellow ABS indicator does not go on, ABS is normal (service code is not stored; temporary failure.).

## Anti-Lock Brake System

### *Output Fluid Pressure Sensor (Front Brake) Offset Abnormal (Service Code 84)*

- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)).

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

★If the yellow ABS indicator does not go on, ABS is normal (service code is not stored; temporary failure.).

### *Fluid Pressure Sensor Supply Voltage Inspection (Service Code 89)*

- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-38)).

★If the yellow ABS indicator light goes on, the ABS hydraulic unit has trouble. Replace the ABS hydraulic unit.

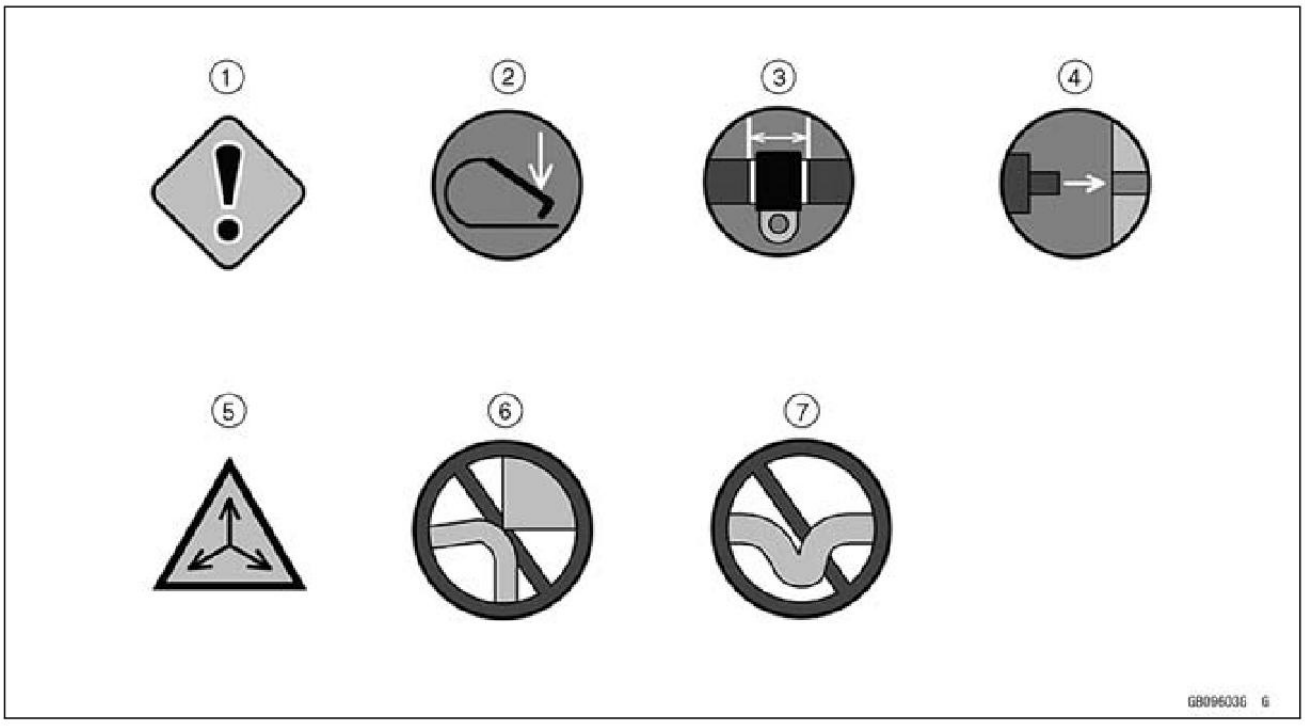
★If the yellow ABS indicator does not go on, ABS is normal (service code is not stored; temporary failure.).

# Appendix

## Table of Contents

Cable, Wire, and Hose Routing ..... 18-2
Troubleshooting Guide ..... 18-64

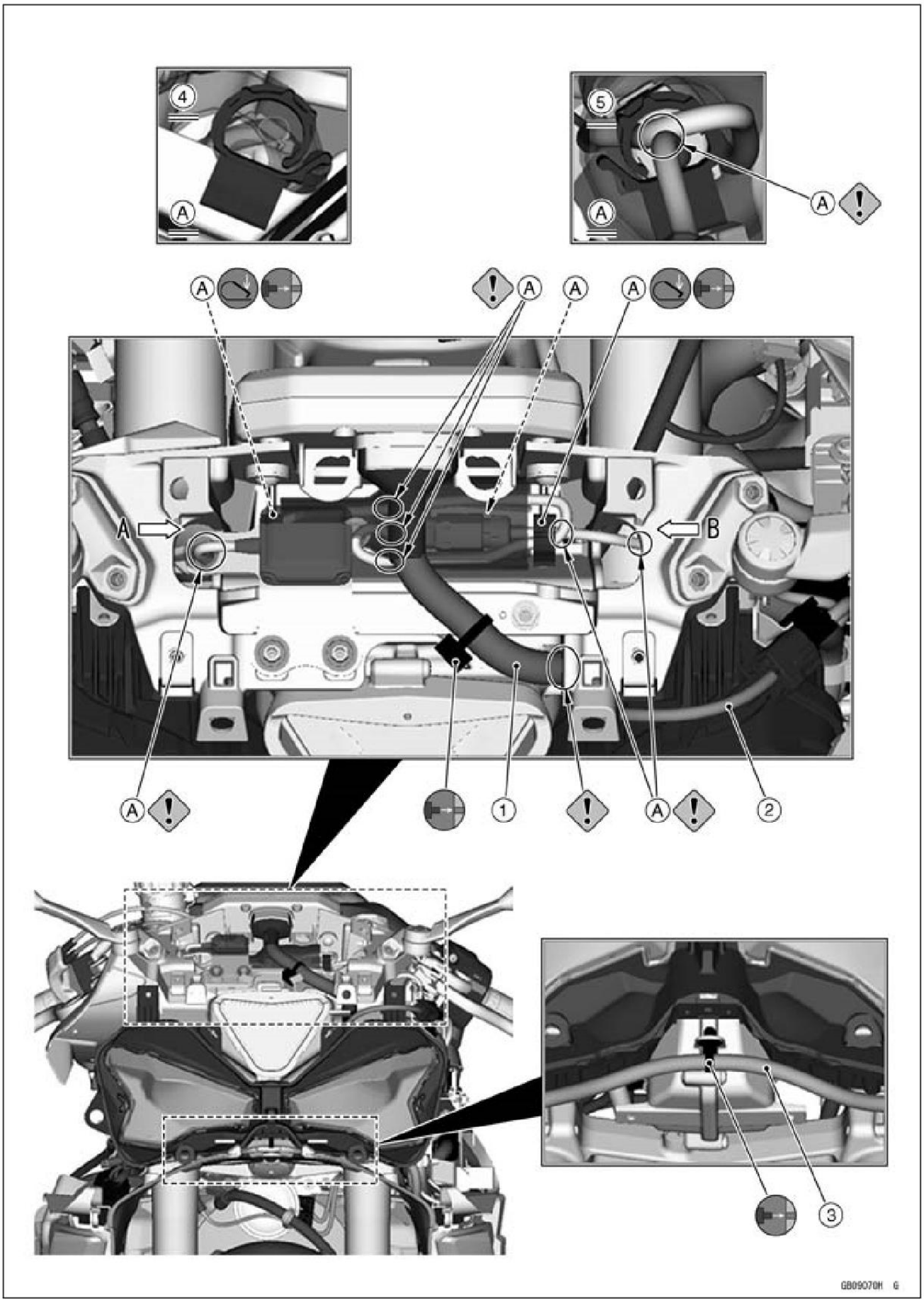
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. This indicates the positional relationships of the cables, wires and hoses. Run them according to the figures.
2. This indicates that it is necessary to hold the cables, wires and hoses with the clamps. Clamp them according to the figures.
3. This indicates that it is necessary to hold the cables, wires and hoses with the clamps. Clamp them at the position indicated by the colored tape or other marks.
4. Install the clamps and/or connectors to the frame or brackets. Install them according to the figures.
5. This indicates the mounting direction of clamps and/or connectors. If there is no detailed explanation, install them according to the figures.
6. Make sure that the cables, wires and hoses do not come into contact with the other leads and the frame.
7. Must be no sagging of leads and/or hoses.

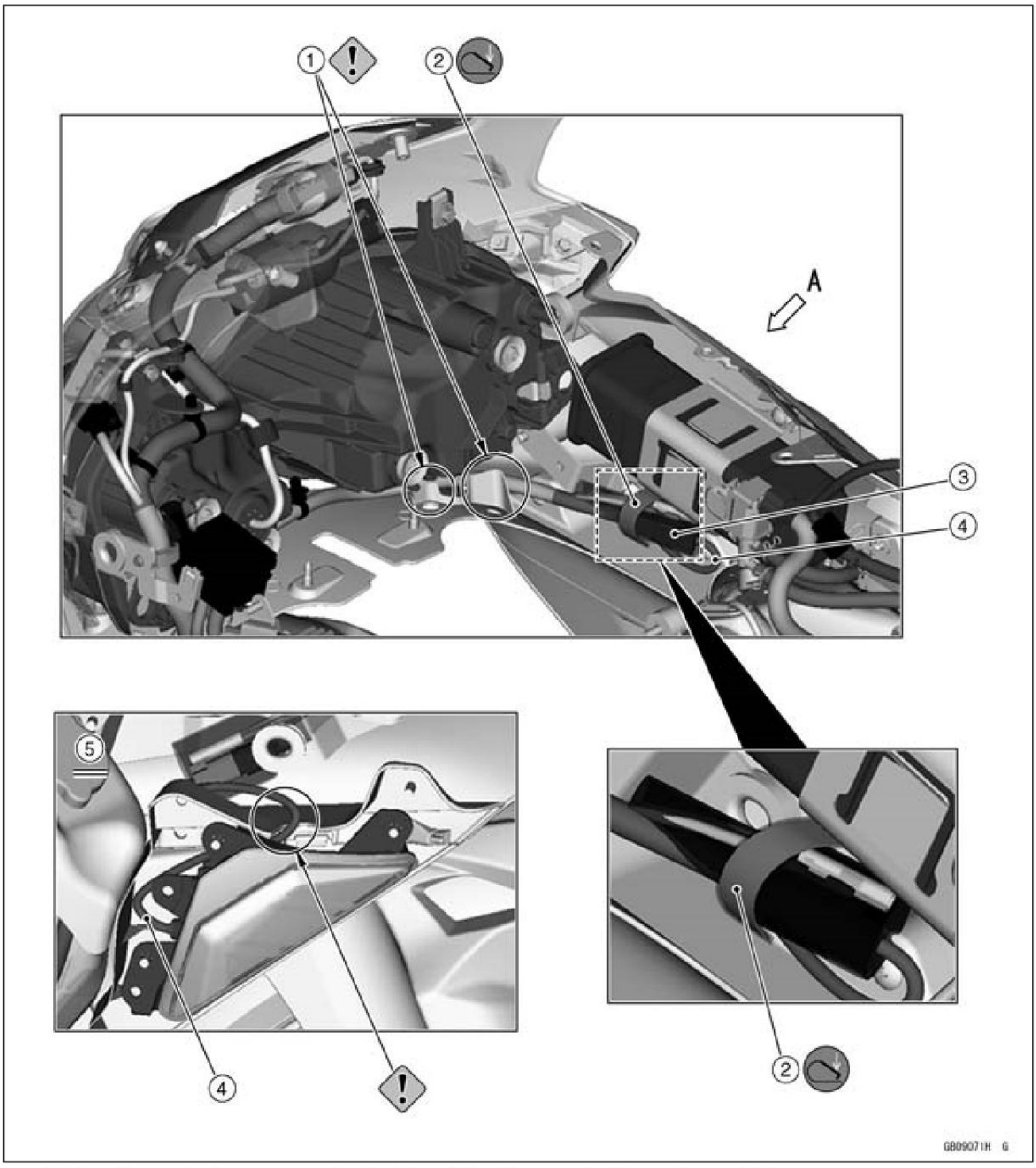
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

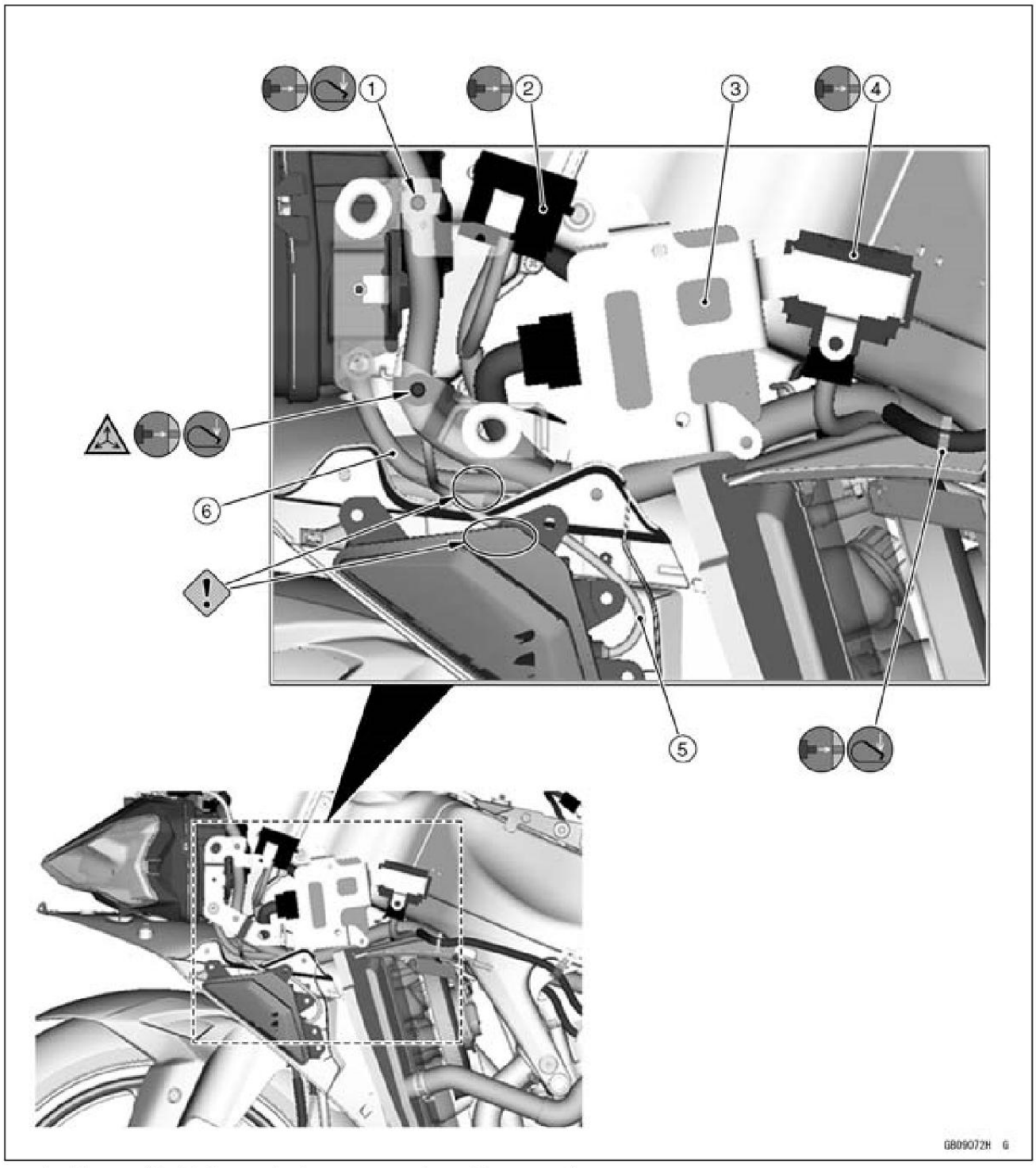
A: Japan Model Only
1. Meter Unit Lead
2. Headlight Lead
3. Main Harness (to Front Right Turn Signal Light)
4. Viewed from A
5. Viewed from B

## Cable, Wire, and Hose Routing



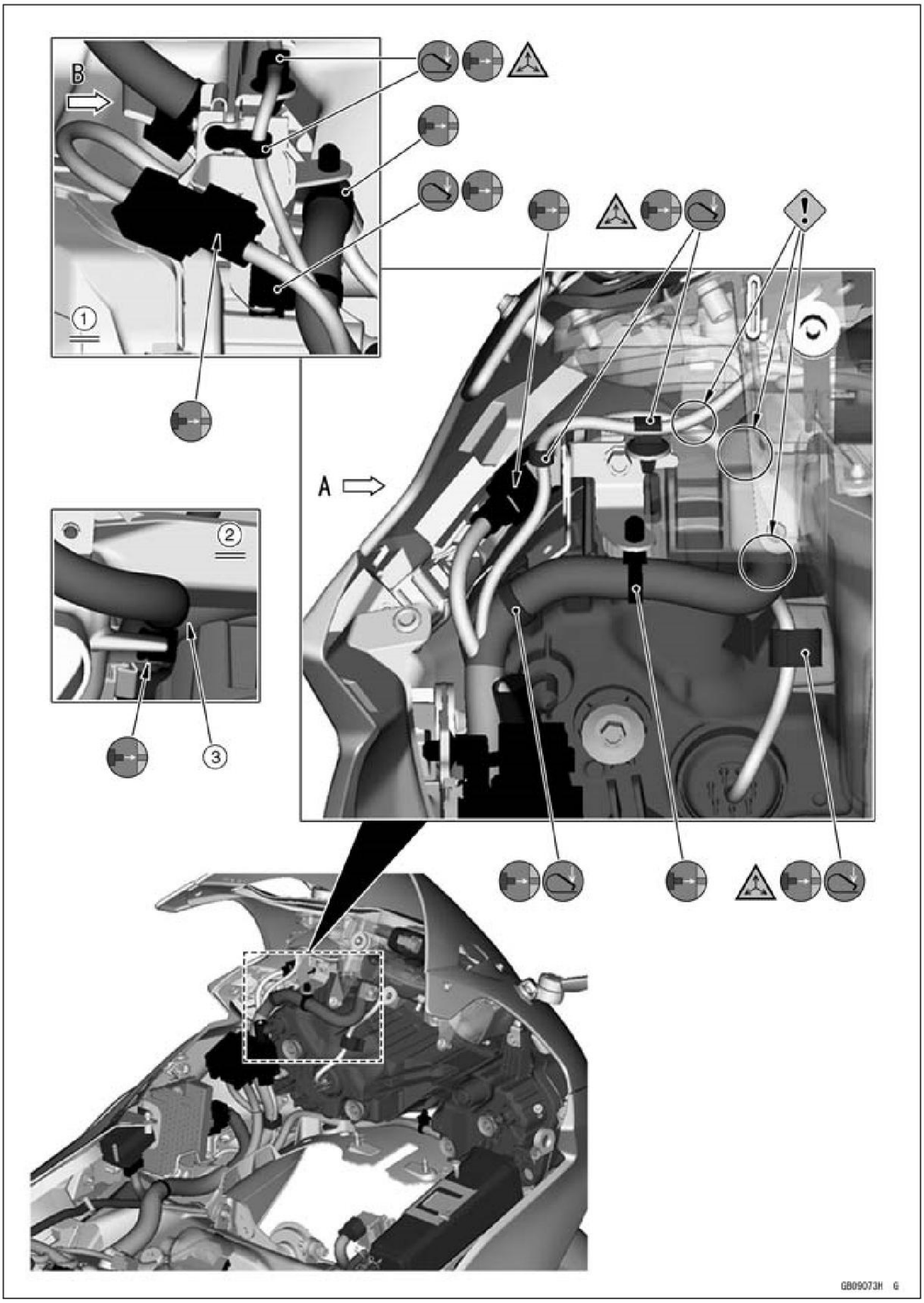

1. Run the main harness to the inside of the ribs on the lower inner fairing.
2. Clamp (Bend it to hold the dust cover.)
3. After connecting the front right turn signal light connector, cover it with a dust cover.
4. Front Right Turn Signal Light Lead
5. Viewed from A

## Cable, Wire, and Hose Routing




1. Clamp (Hold the main harness at the white tape.)
2. Fuse Box
3. Regulator/Rectifier
4. Immobilizer Amplifier (Equipped Models)
5. Front Left Turn Signal Light Lead
6. Main Harness (to Front Right Turn Signal Light)

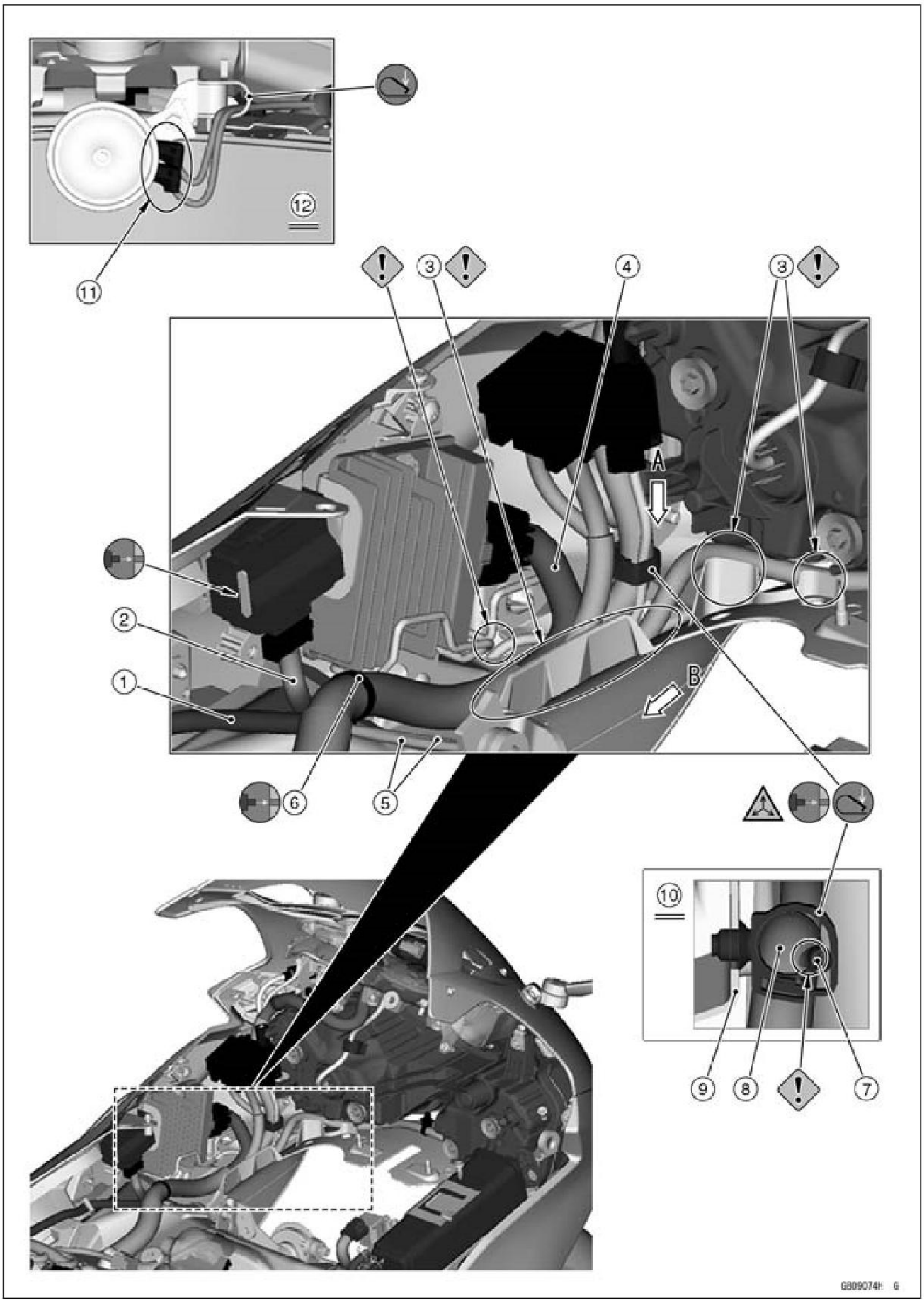
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Viewed from A
2. Viewed from B
3. Run the meter unit lead under the air intake duct.

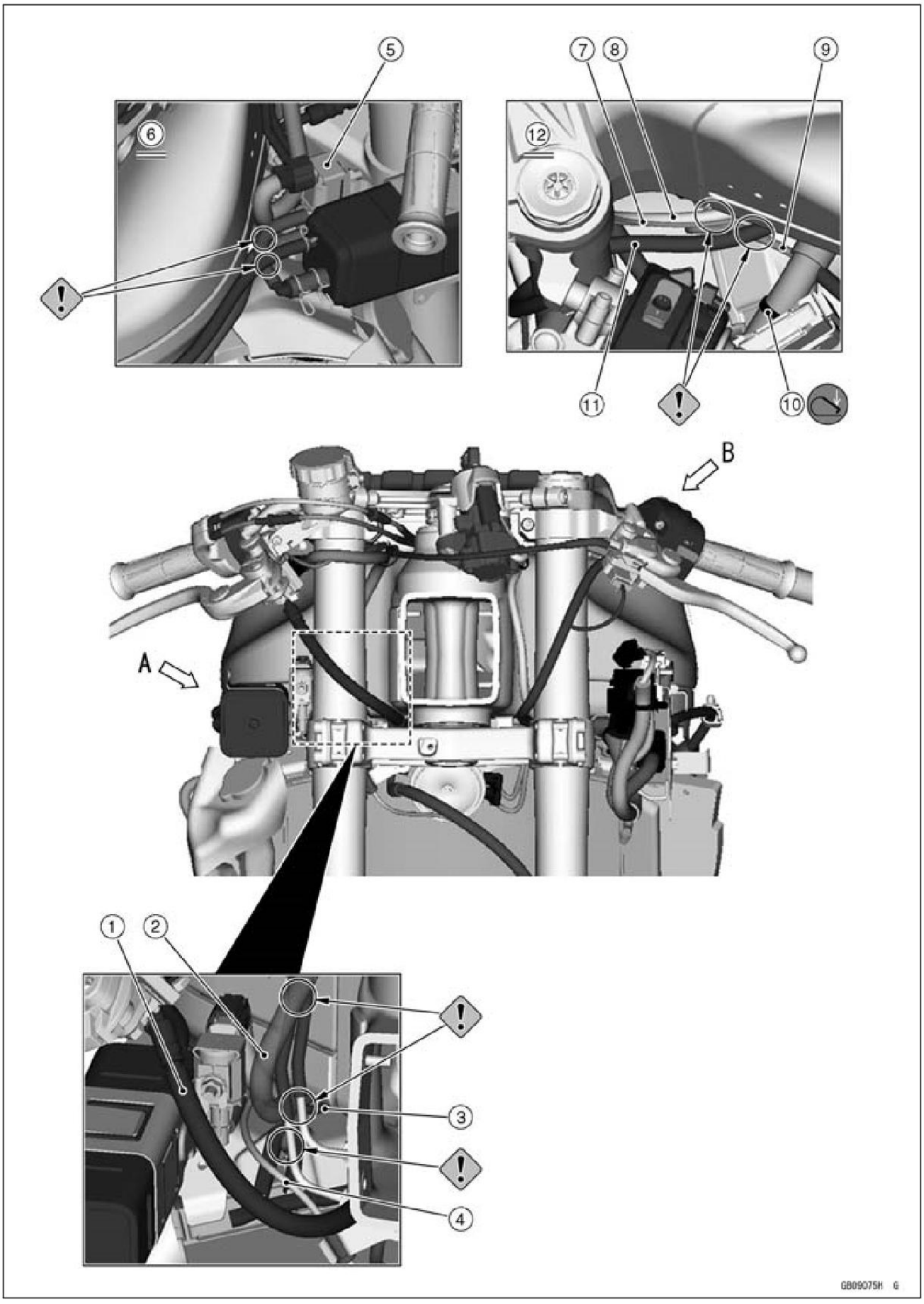
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Alternator Lead
2. Immobilizer Amplifier Lead (Equipped Models)
3. Run the main harness to the inside of the ribs on the lower inner fairing.
4. Regulator/Rectifier Lead
5. Horn Leads
6. Clamp (Hold the main harness to the heat insulation plate.)
7. Front Left Turn Signal Light Lead
8. Main Harness (to Headlight)
9. Bracket
10. Viewed from A
11. Horn Leads (Connect the long lead to down the terminal and the short lead to upper the terminal.)
12. Viewed from B

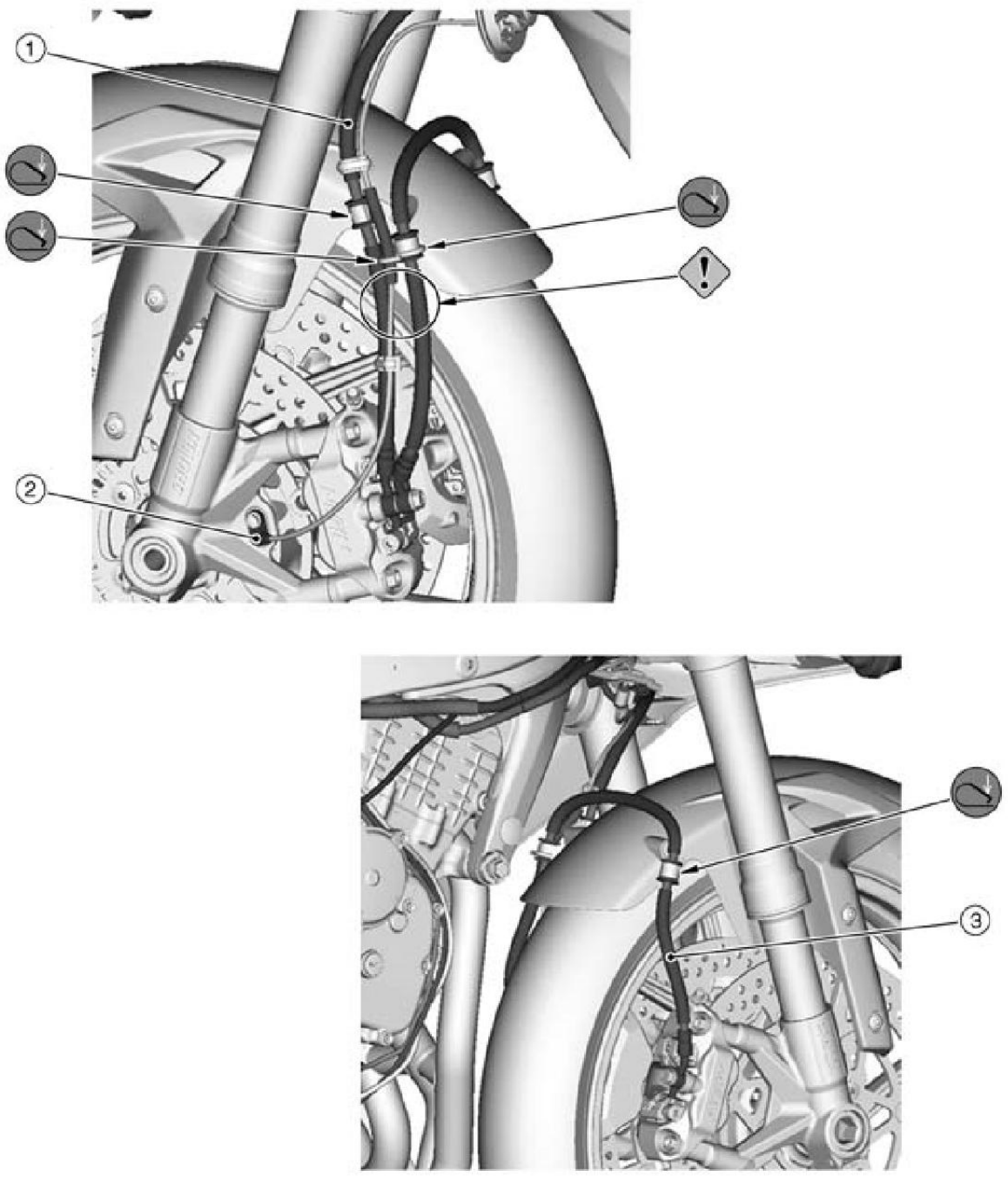
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

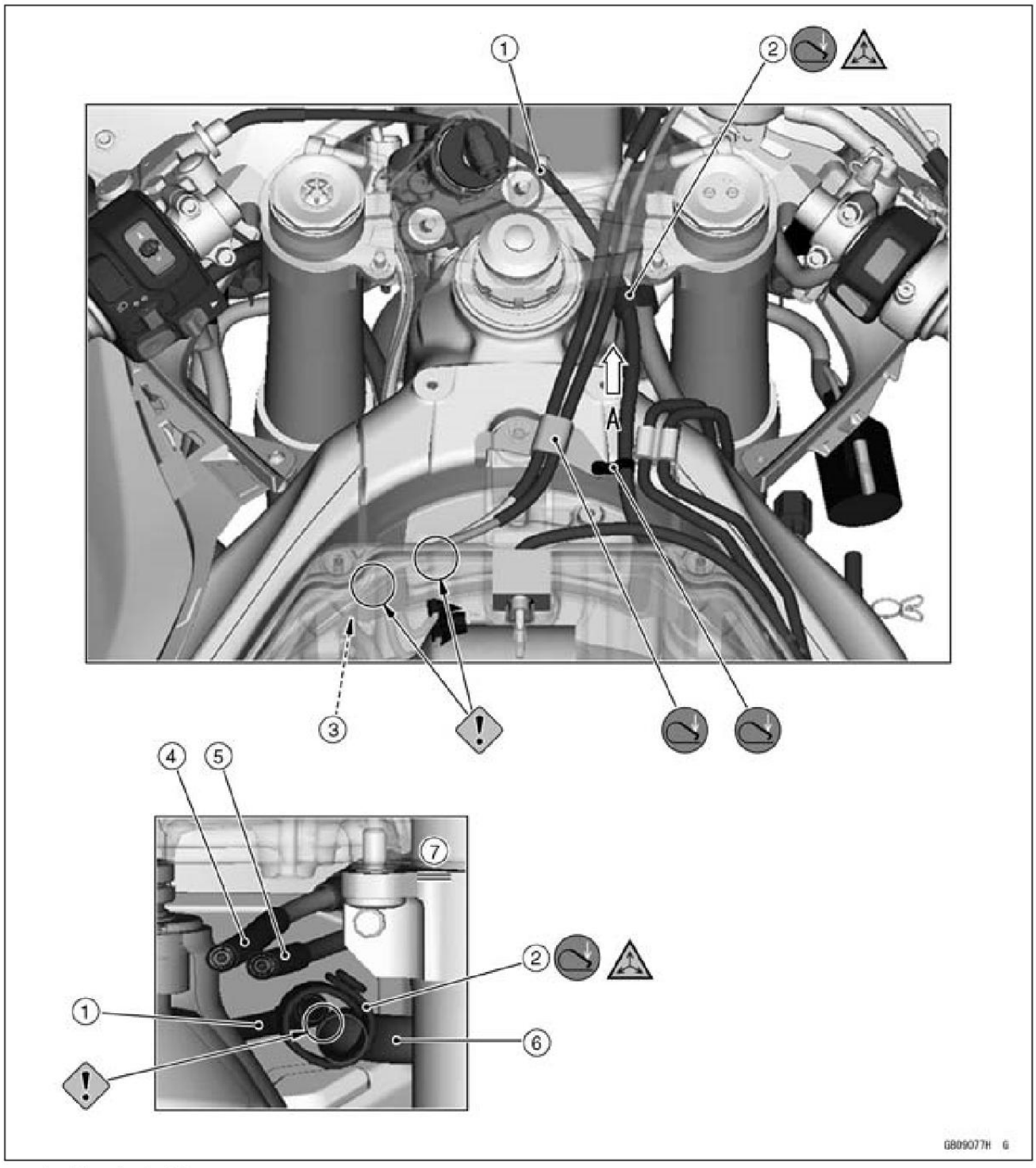
1. Front Brake Hose
2. Right Switch Housing Lead
3. Radiator Fan Motor Lead
4. Front Wheel Rotation Sensor Lead
5. Purge Valve (Other than US and CA Models)
6. Viewed from A
7. Immobilizer Antenna Lead (Equipped Models)
8. Ignition Switch Lead
9. Horn Leads
10. Clamp (Hold the main harness to the heat insulation plate.)
11. Left Switch Housing Lead
12. Viewed from B

## Cable, Wire, and Hose Routing



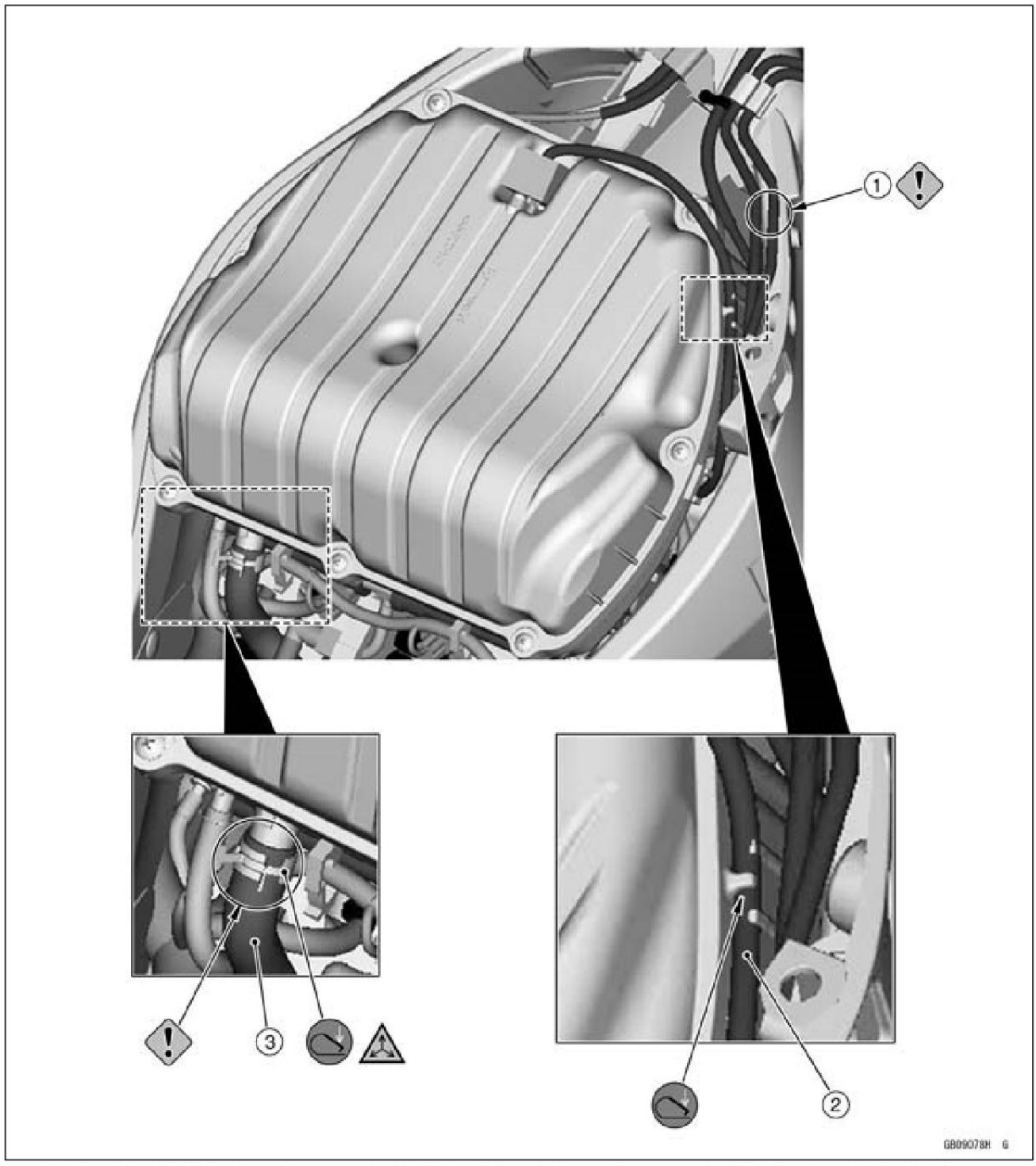

1. Front Brake Hose
2. Front Wheel Rotation Sensor
3. Front Brake Hose (Front Brake Calipers)

## Cable, Wire, and Hose Routing



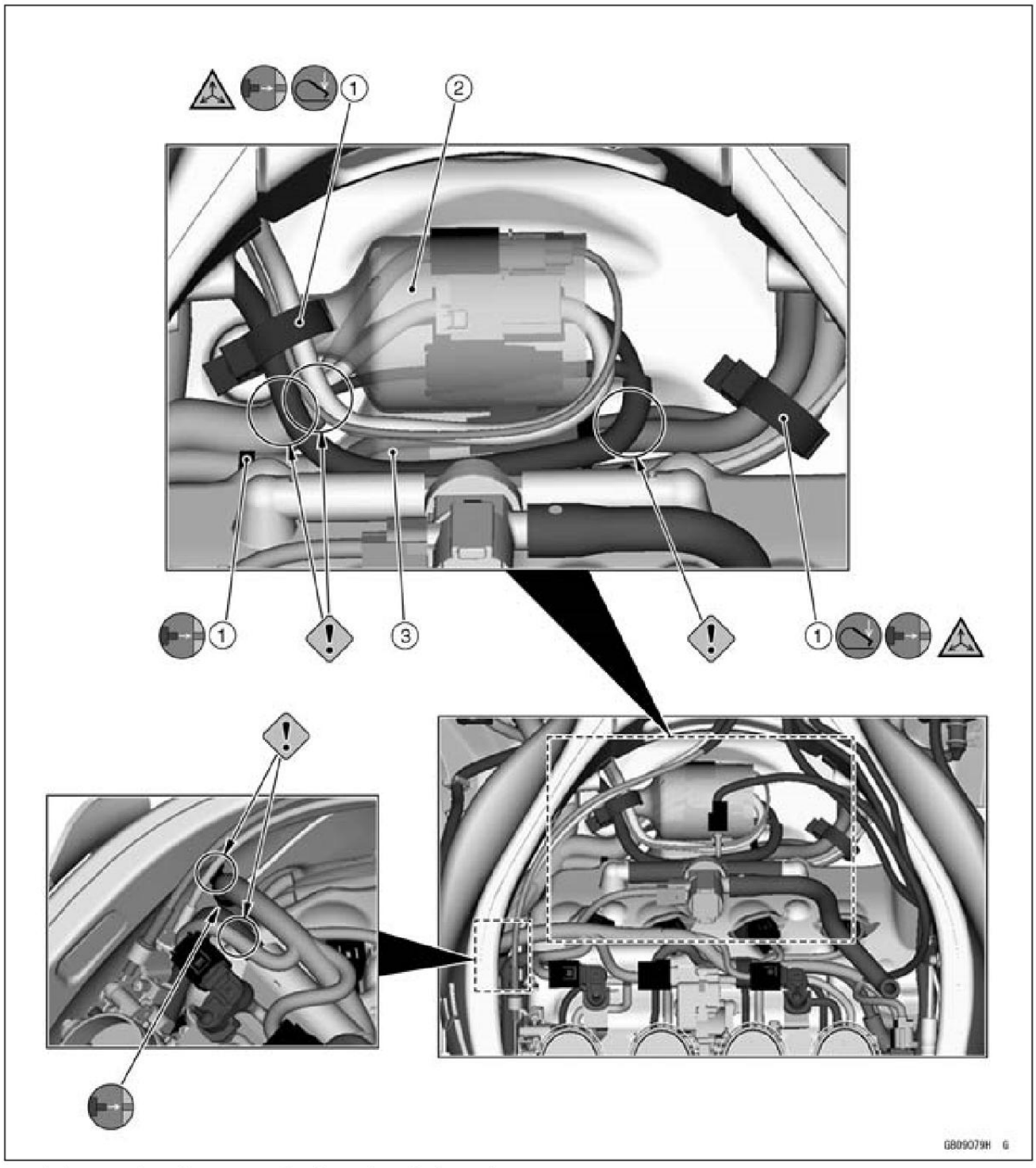

1. Clutch Cable
2. Clamp (Hold the clutch cable and right switch housing lead. The clamp position is from the center of the frame head pipe to the rear of the vehicle.)
3. Run the throttle cables between the air cleaner housing and frame.
4. Throttle Cable (Accelerator)
5. Throttle Cable (Decelerator)
6. Right Switch Housing Lead
7. Viewed from A

## Cable, Wire, and Hose Routing



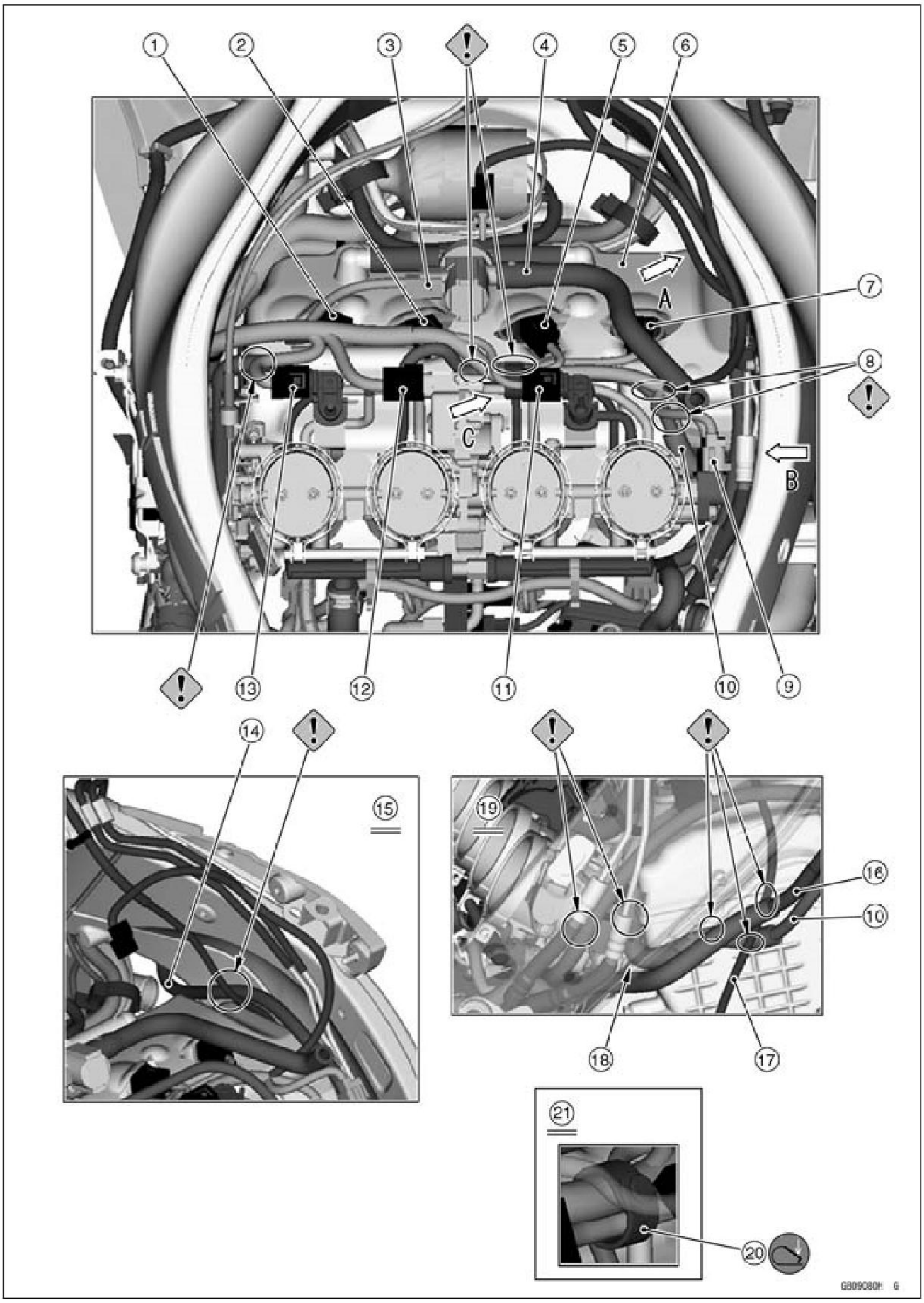

1. Run the ABS brake pipes to the inside of the right tank cover. (ABS Equipped Models)
2. Intake Air Temperature Sensor Lead
3. Breather Hose

## Cable, Wire, and Hose Routing




1. Insert the clamps to the heat insulation plate.
2. After connecting the left switch housing connector, immobilizer antenna connector (equipped models) and ignition switch connector, cover the connectors with the dust cover.
3. After connecting the right switch housing connector, radiator fan motor connector and front wheel rotation sensor connector, cover the connectors with the dust cover. Place the dust cover in the recess of the heat insulation plate.

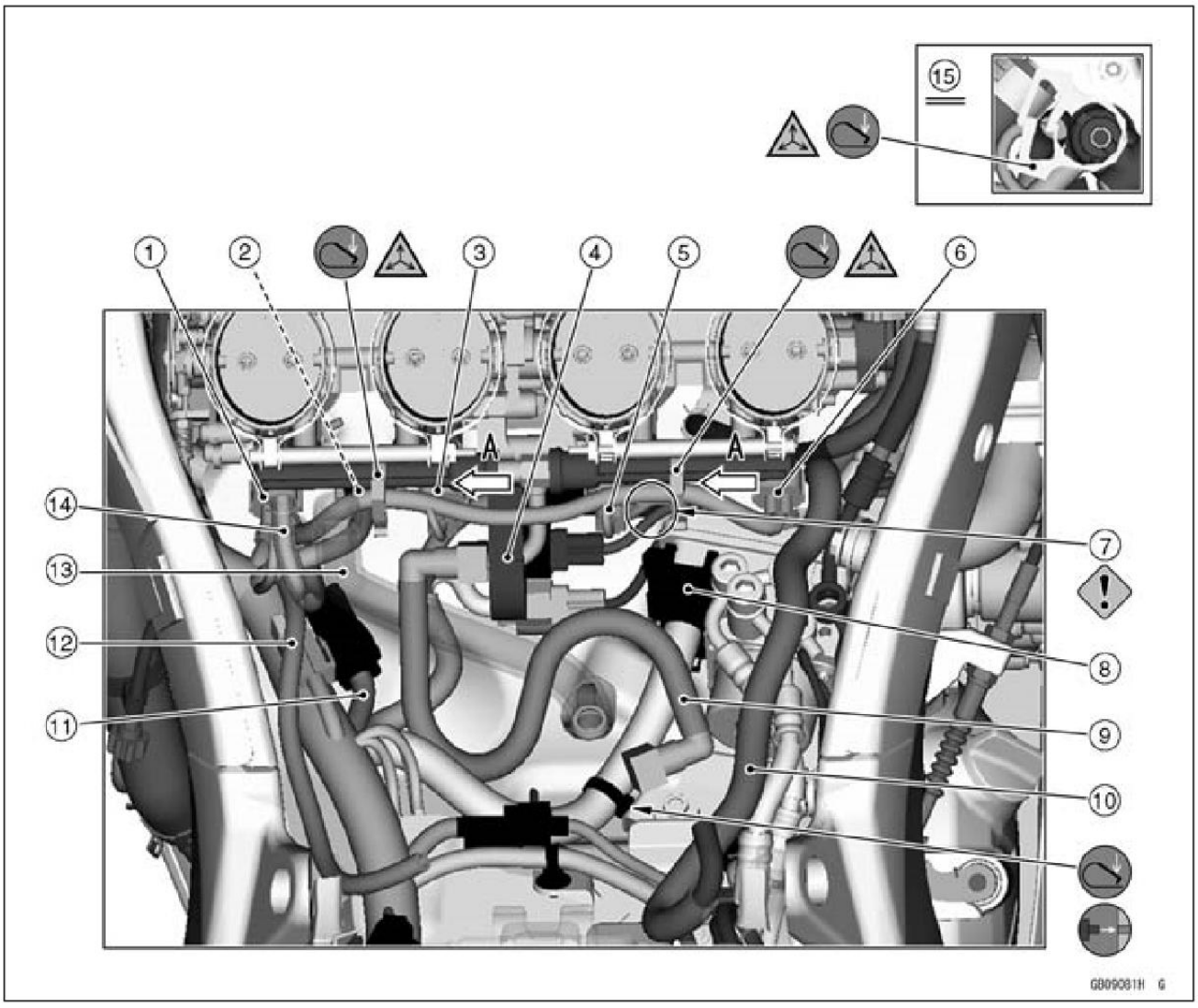
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

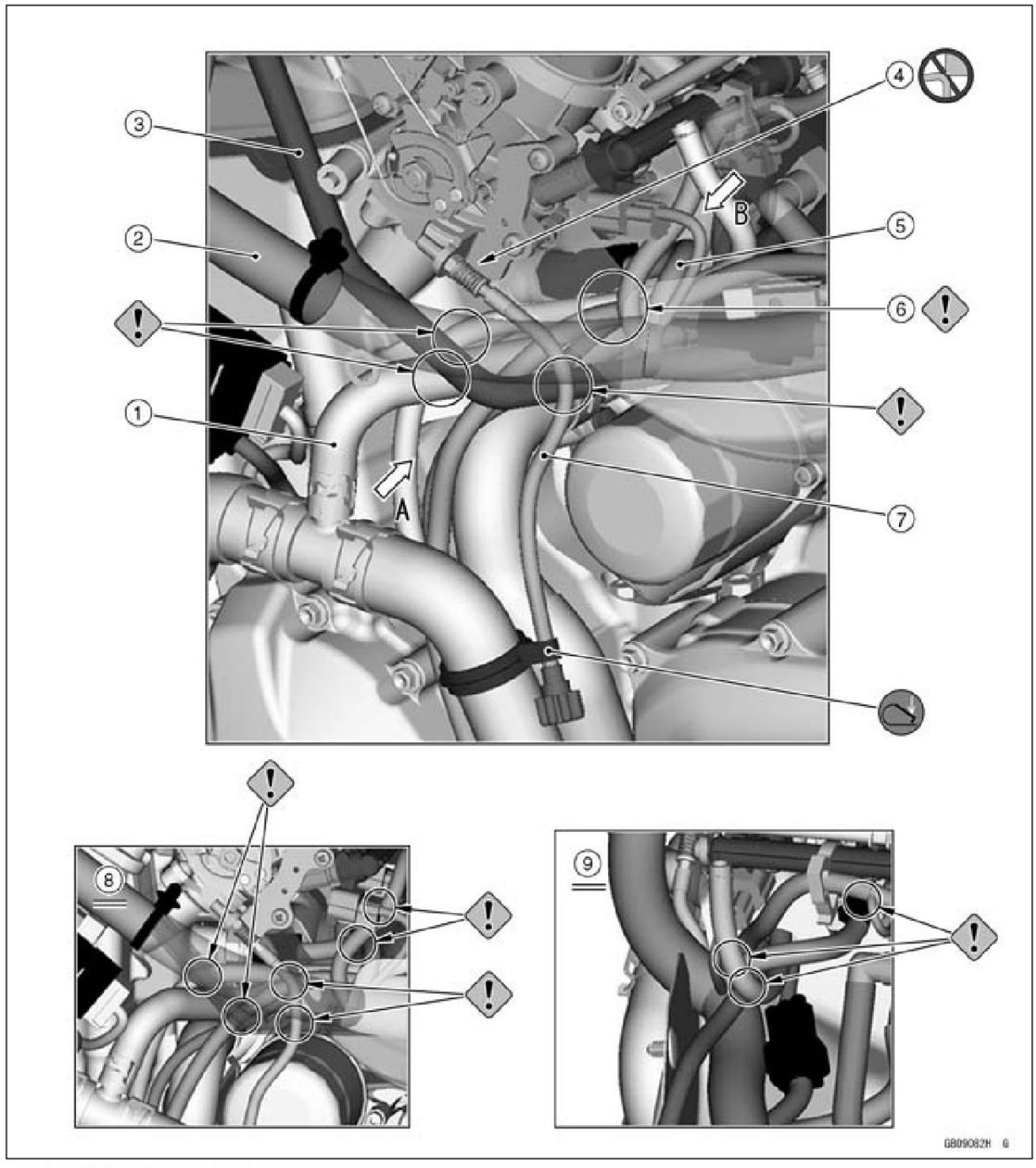
1. Stick Coil #1 Connector
2. Stick Coil #2 Connector
3. Air Switching Valve Connector
4. Air Switching Valve Hose
5. Stick Coil #3 Connector
6. Be careful not to turned up the rubber cover.
7. Stick Coil #4 Connector
8. Run the purge hose under the main harness. (Other than US and CA Models)
9. Throttle Position Sensor Connector
10. Purge Hose (Purge Valve – Throttle Body Assy) (Other than US and CA Models)
11. Intake Air Pressure Sensor #2 Connector
12. Subthrottle Valve Actuator Connector
13. Intake Air Pressure Sensor #1 Connector
14. Air Bleeder Hose
15. Viewed from A
16. Fuel Tank Breather Hose (Other than US and CA Models)
17. Clutch Cable
18. Run the purge hose under the throttle position sensor connector. (Other than US and CA Models)
19. Viewed from B
20. Clamp (Hold the main harness and throttle body hose.)
21. Viewed from C

## Cable, Wire, and Hose Routing



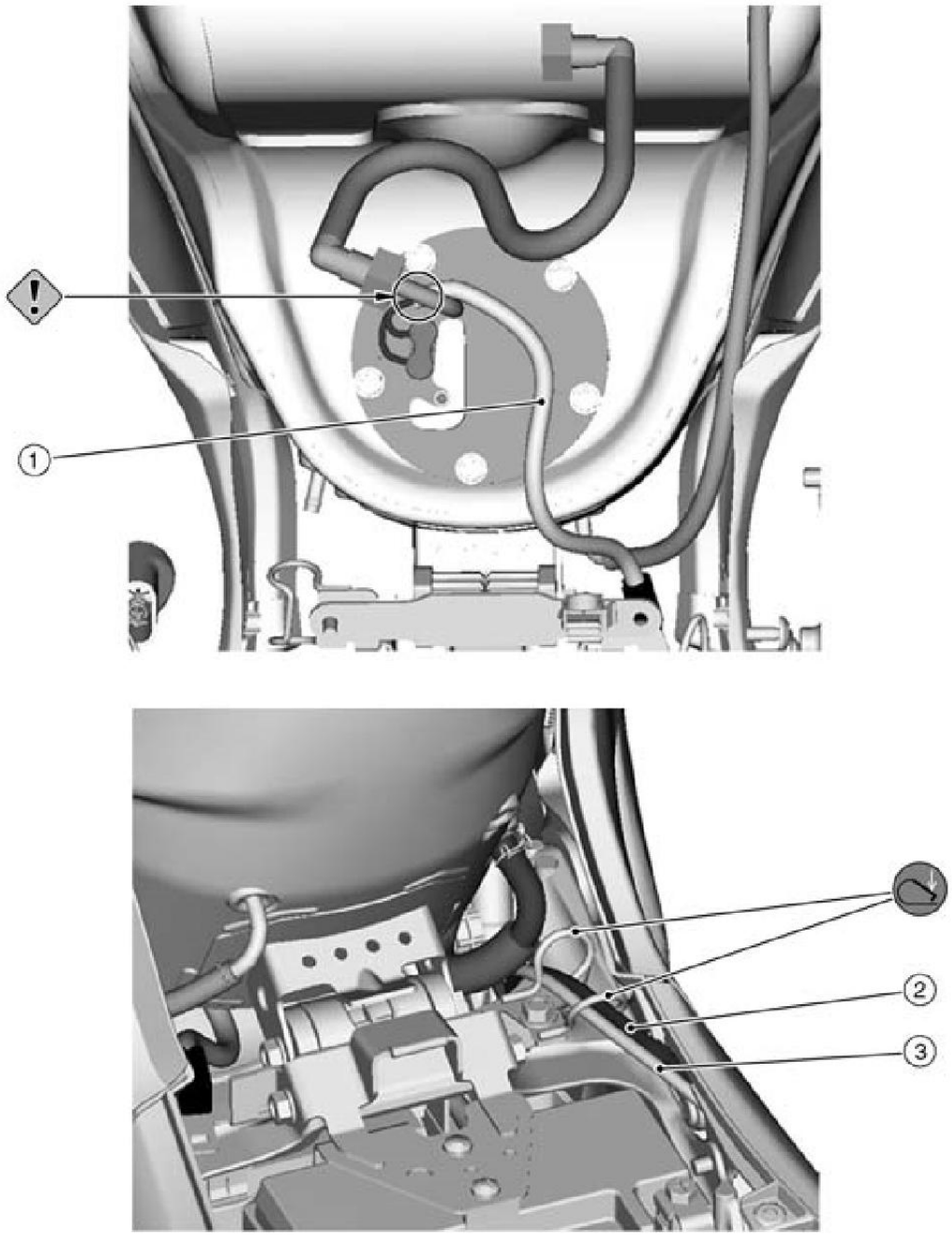

1. Fuel Injector #1 Connector
2. Run the water temperature sensor lead through the hole of the rubber cover.
3. Fuel Injector #2 Connector
4. Pad
5. Fuel Injector #3 Connector
6. Fuel Injector #4 Connector
7. Run the crankshaft sensor lead, front oxygen sensor lead and rear oxygen sensor lead (equipped models) through the slit of the rubber cover.
8. ABS Hydraulic Unit Connector (ABS Equipped Models)
9. Fuel Hose
10. Fuel Tank Breather Hose (Other than US and CA Models)
11. Gear Position Switch Lead
12. Fuel Tank Drain Hose
13. Breather Hose
14. Air Cleaner Drain Hose
15. Viewed from A

## Cable, Wire, and Hose Routing




1. Oil Cooler Outlet Hose
2. Main Harness
3. Breather Hose
4. Do not let the throttle body assy and main harness interfere.
5. Water Temperature Sensor Lead
6. Run the gear position switch lead, fuel tank drain hose and air cleaner drain hose through the slit of the rubber cover.
7. Idle Speed Adjusting Screw Cable
8. Viewed from A
9. Viewed from B

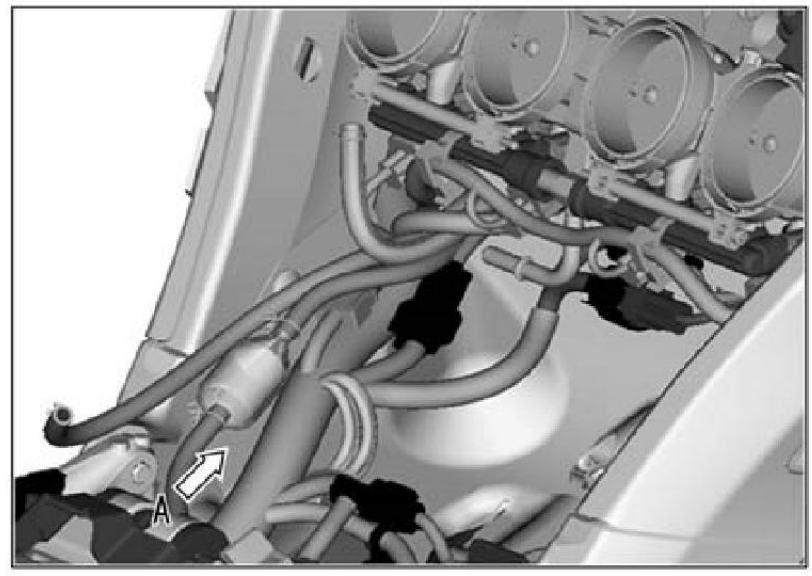
## Cable, Wire, and Hose Routing

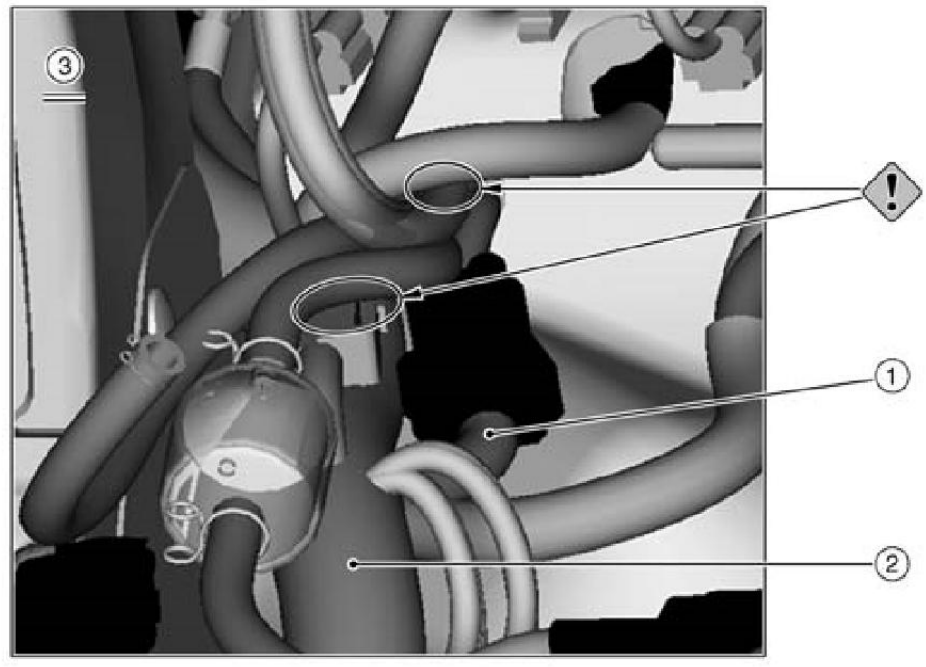



1. Fuel Pump Lead
2. Exhaust Butterfly Valve Close Cable (Black)
3. Exhaust Butterfly Valve Open Cable (White)

## Cable, Wire, and Hose Routing

### US and CA Models



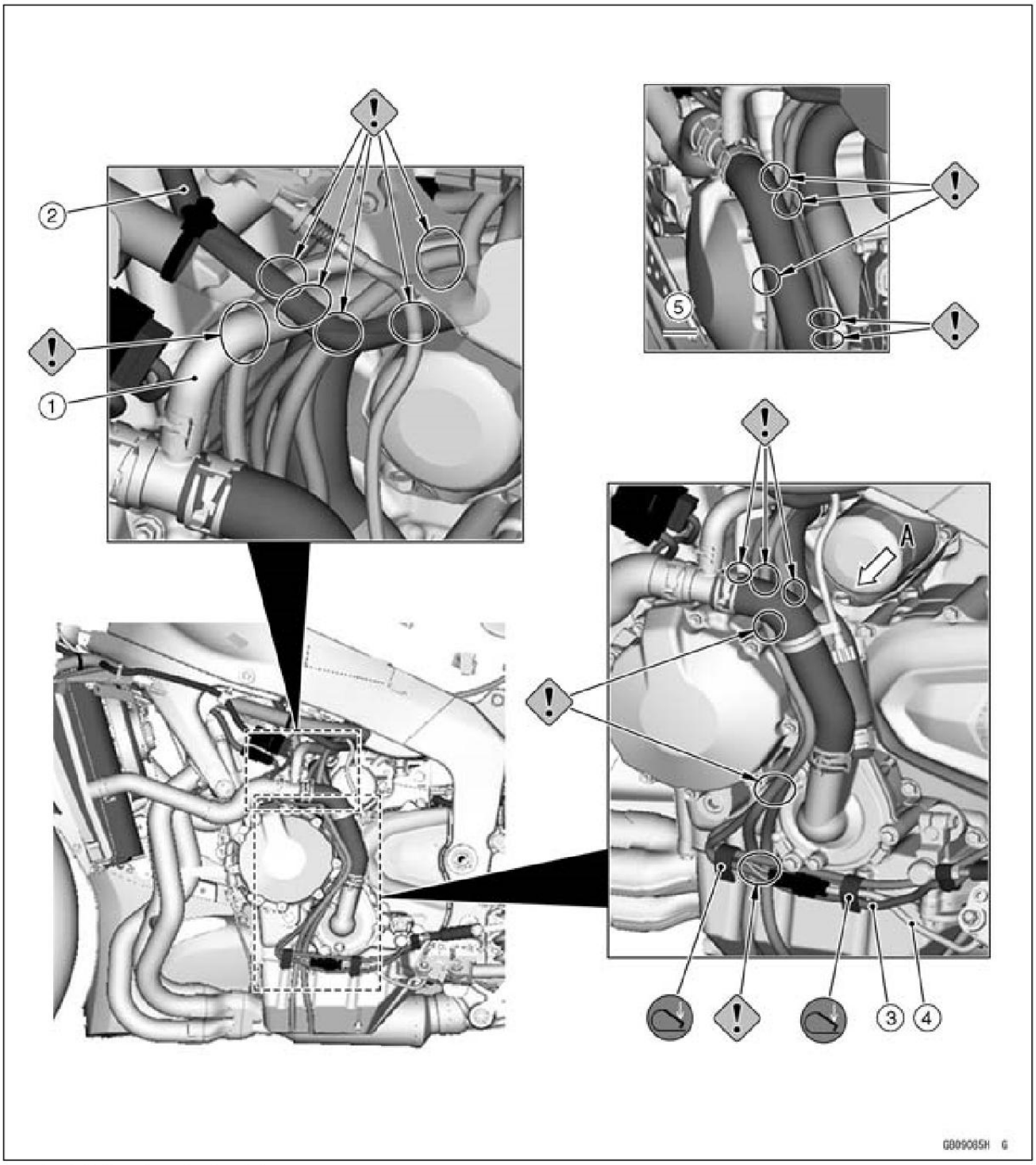




GB090684H G

1. Gear Position Switch Lead
2. Main Harness
3. Viewed from A

## Cable, Wire, and Hose Routing

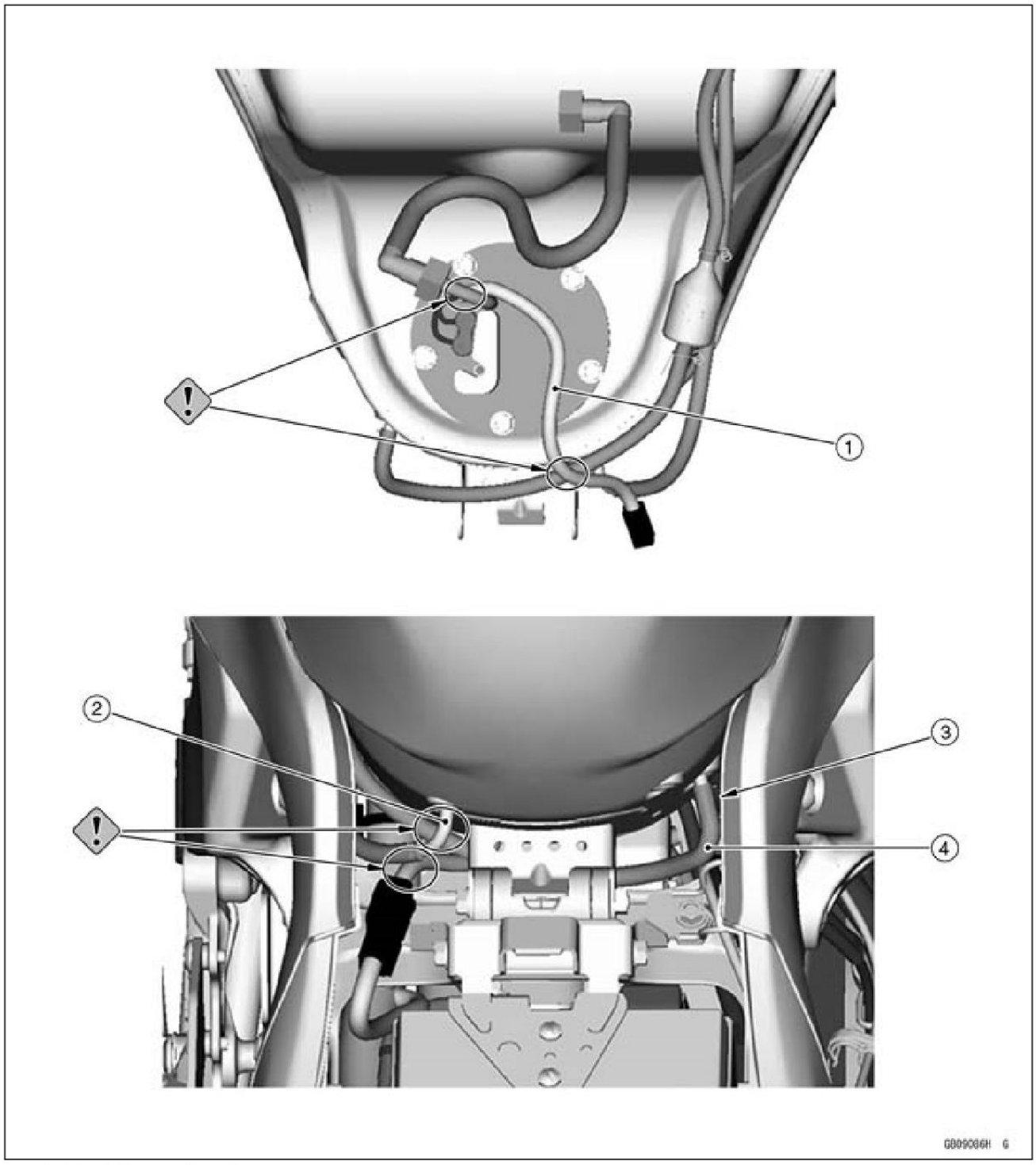
### US and CA Models




1. Oil Cooler Outlet Hose
2. Breather Hose
3. Quick Shifter Sensor Lead
4. Side Stand Switch Lead
5. Viewed from A

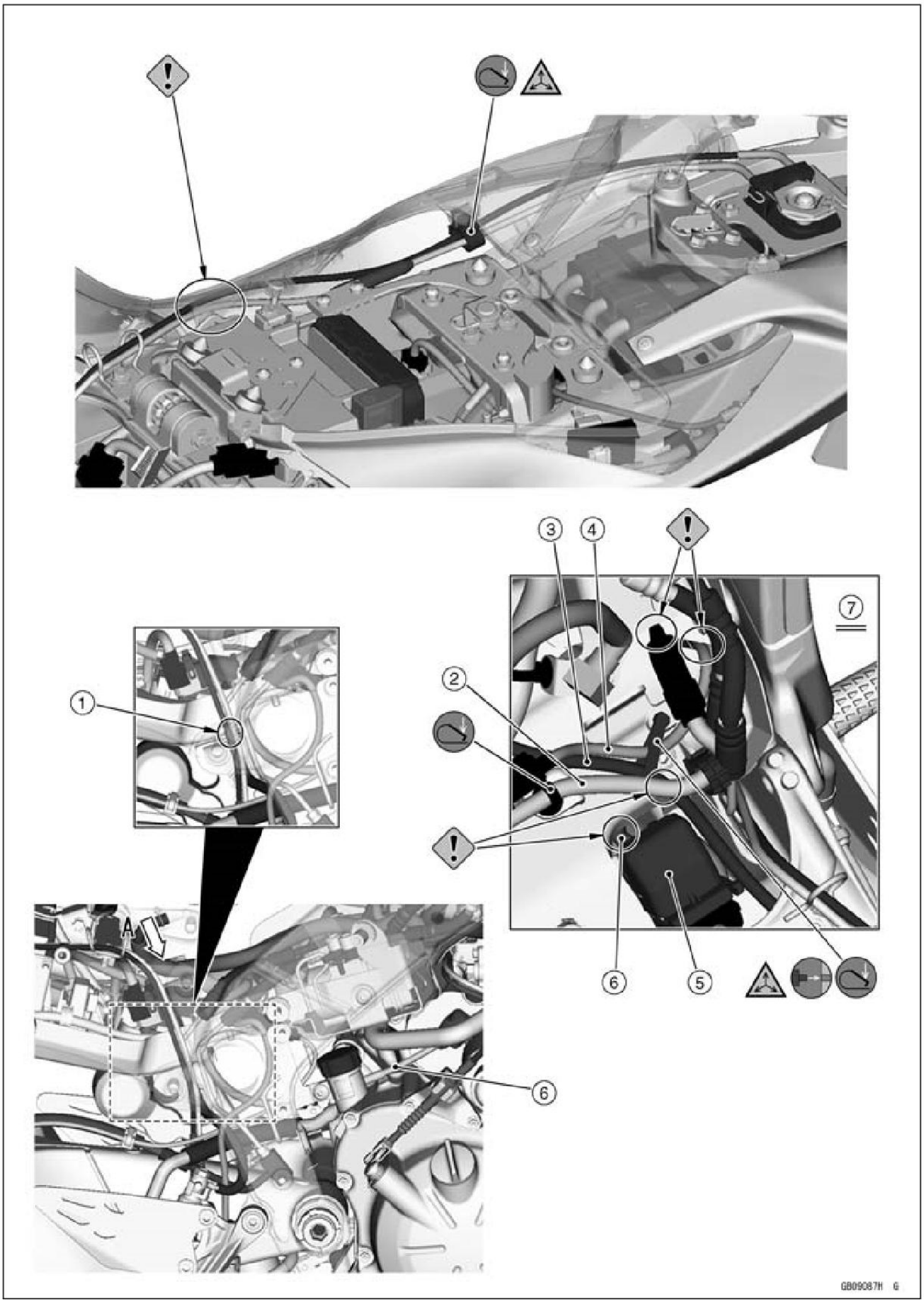
## Cable, Wire, and Hose Routing

### US and CA Models




1. Fuel Pump Lead
2. Fuel Tank Drain Hose
3. Run the fuel tank breather hose toward the left down way.
4. Fuel Tank Breather Hose

## Cable, Wire, and Hose Routing

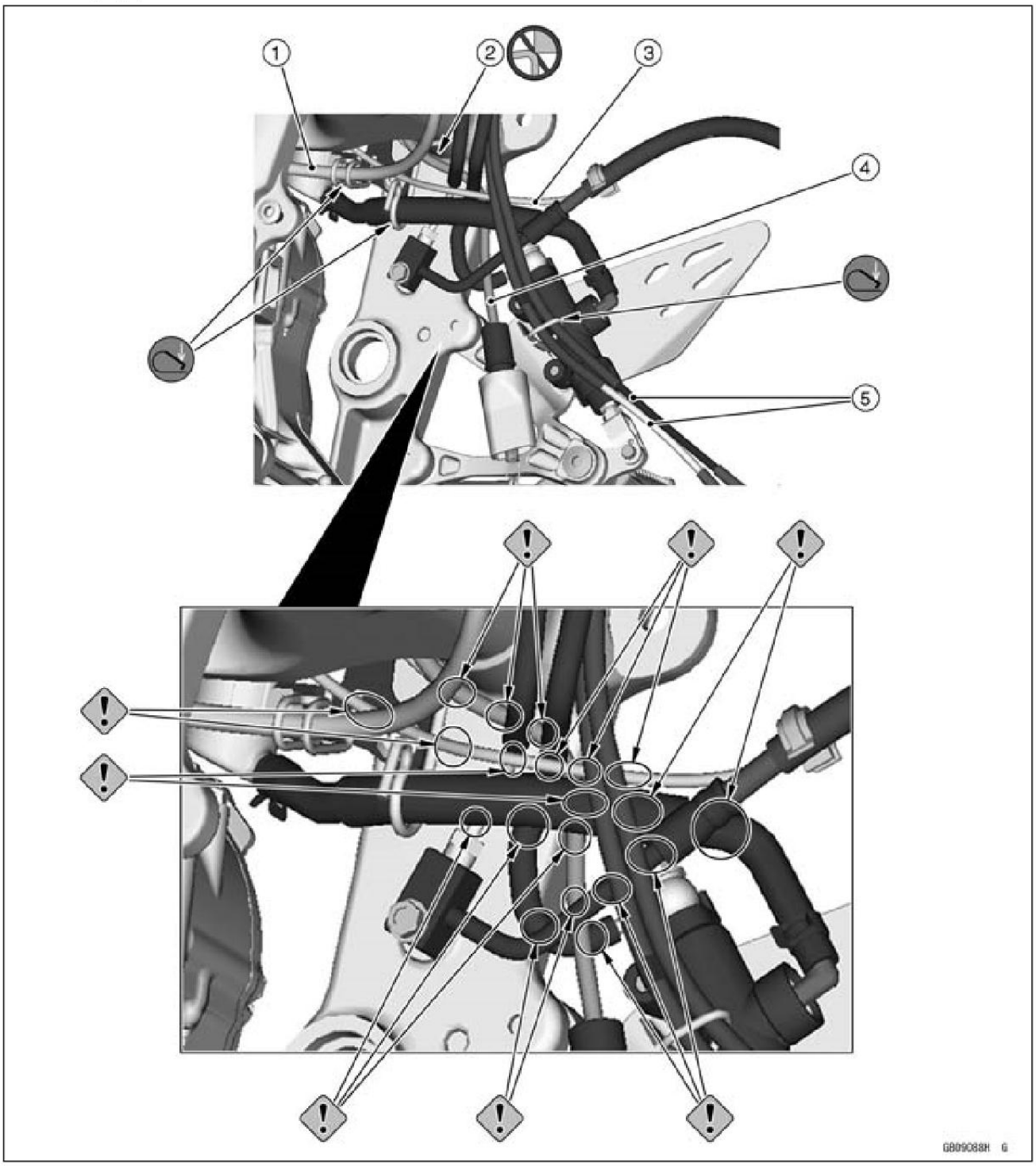


## Cable, Wire, and Hose Routing

1. Run the exhaust butterfly valve cables between the ABS brake pipes (ABS equipped models) and frame.
2. Rear Wheel Rotation Sensor Lead
3. Battery Negative (–) Cable
4. Rear Brake Light Switch Lead
5. Starter Relay Cover
6. Starter Motor Cable
7. Viewed from A

## Cable, Wire, and Hose Routing

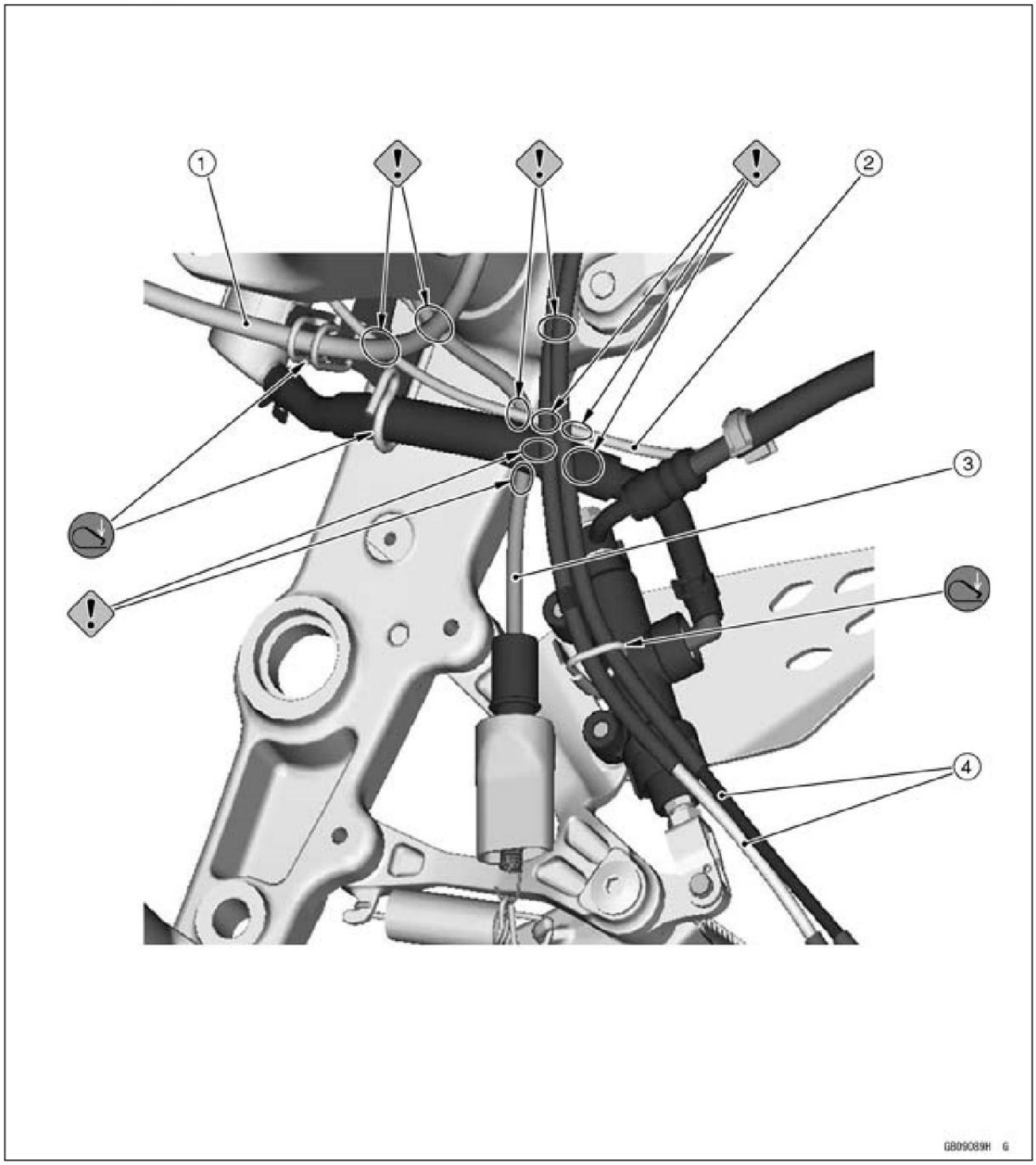
### ABS Equipped Models




1. Starter Motor Cable
2. Do not pinch the rear brake light switch lead between the ABS brake pipes and frame.
3. Rear Wheel Rotation Sensor Lead
4. Rear Brake Light Switch Lead
5. Exhaust Butterfly Valve Cables

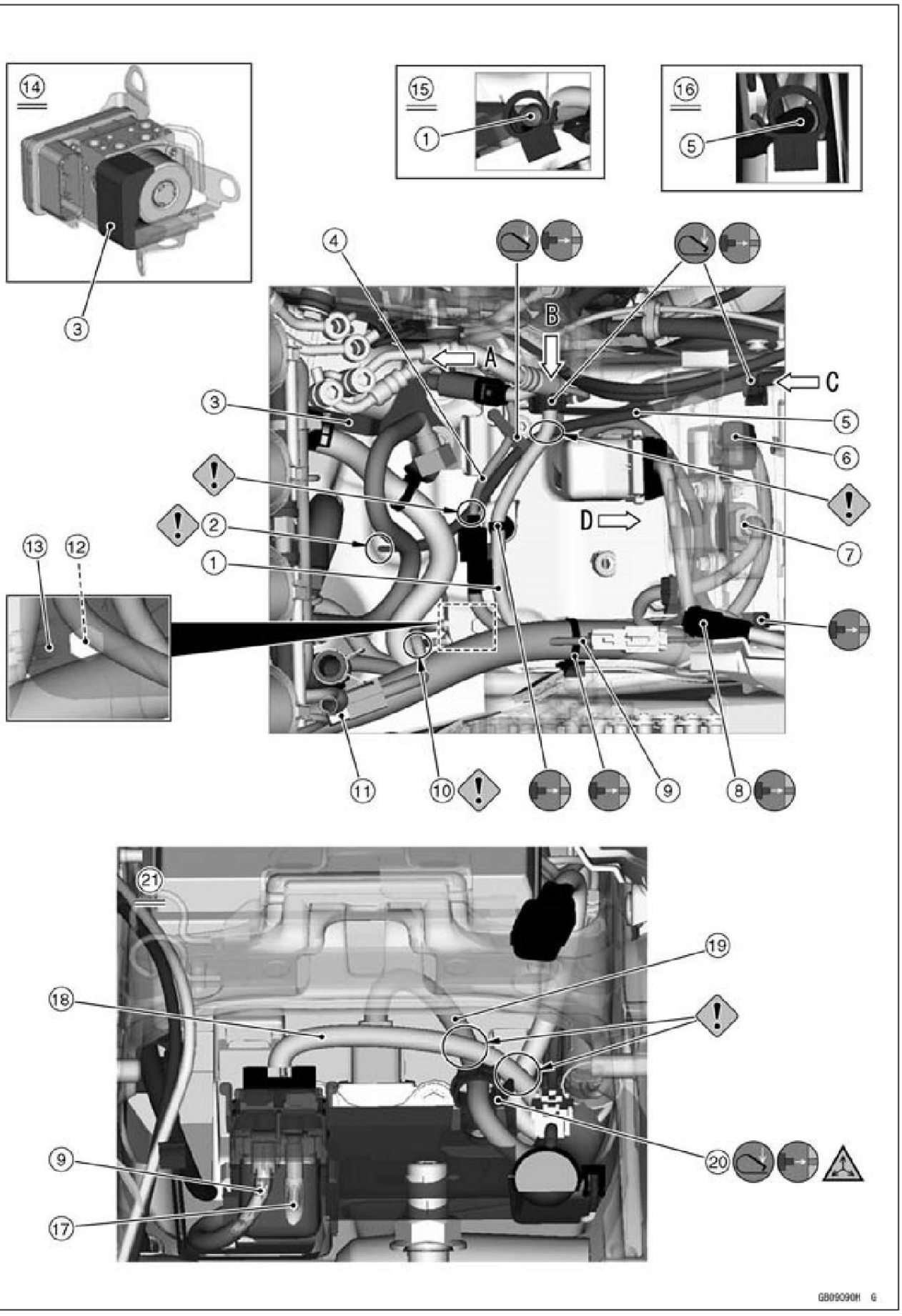
## Cable, Wire, and Hose Routing

### ABS Unequipped Models




1. Starter Motor Cable
2. Rear Wheel Rotation Sensor Lead
3. Rear Brake Light Switch Lead
4. Exhaust Butterfly Valve Cables

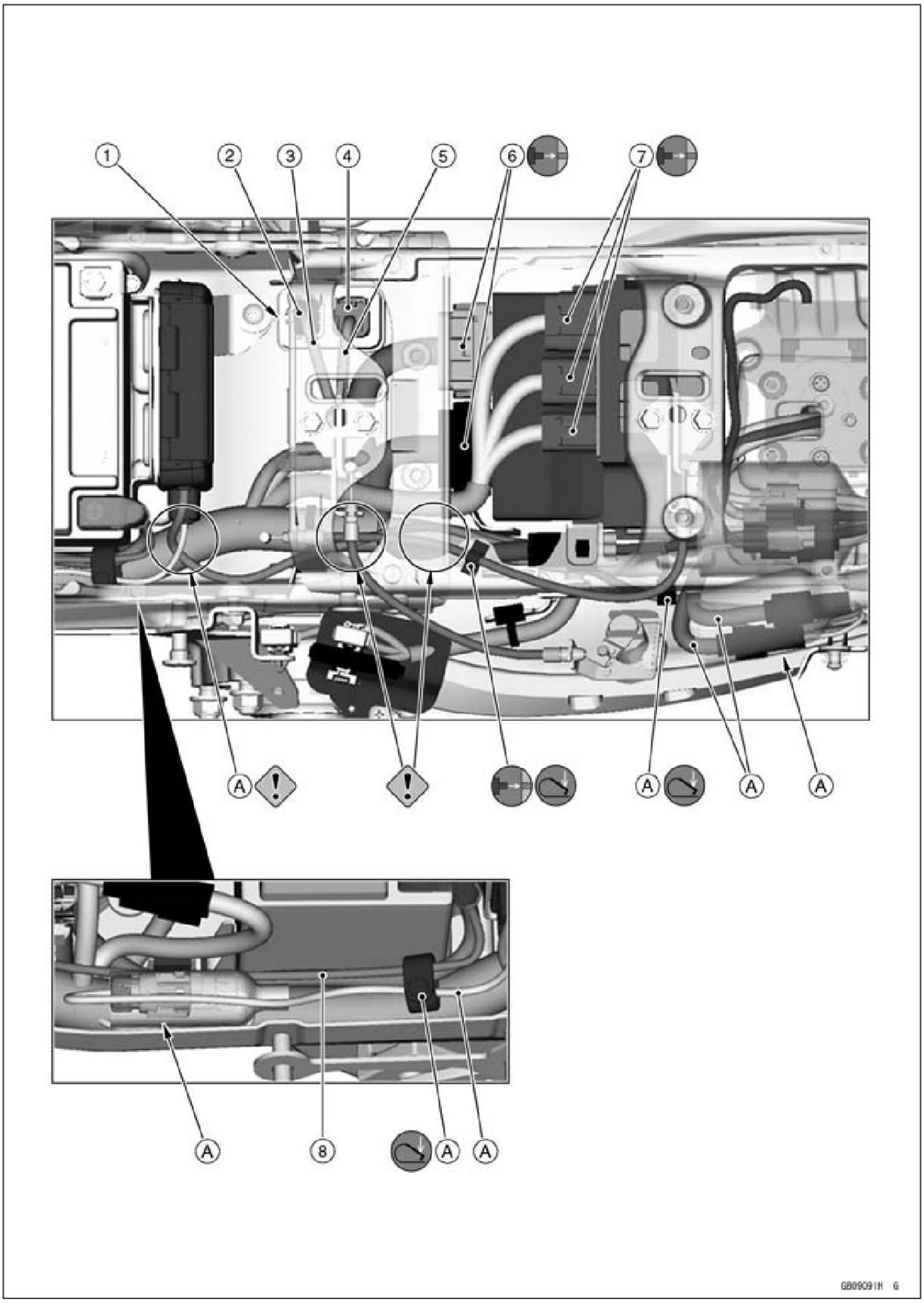
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Main Harness (to Rear Wheel Rotation Sensor)
2. Run the battery negative (–) cable through the slit of the heat insulation rubber plate.
3. Pad (ABS equipped models) (Install the pad aligning its shape with the hydraulic unit.)
4. Rear Brake Light Switch Lead
5. Battery Negative (–) Cable
6. Turn Signal Relay
7. Vehicle-down Sensor
8. Fuel Pump Connector (Insert it on the bracket.)
9. Battery Positive (+) Cable
10. Frame Ground
11. Rectifier
12. Frame Ground Terminal Bolt
13. Cover the frame ground terminal bolt with the pad.
14. Viewed from A
15. Viewed from B
16. Viewed from C
17. Starter Motor Cable
18. Starter Relay Lead
19. Vehicle-down Sensor Lead
20. Be careful not to allow an excessive tension on the vehicle-down sensor lead between the clamp and sensor.
21. Viewed from D

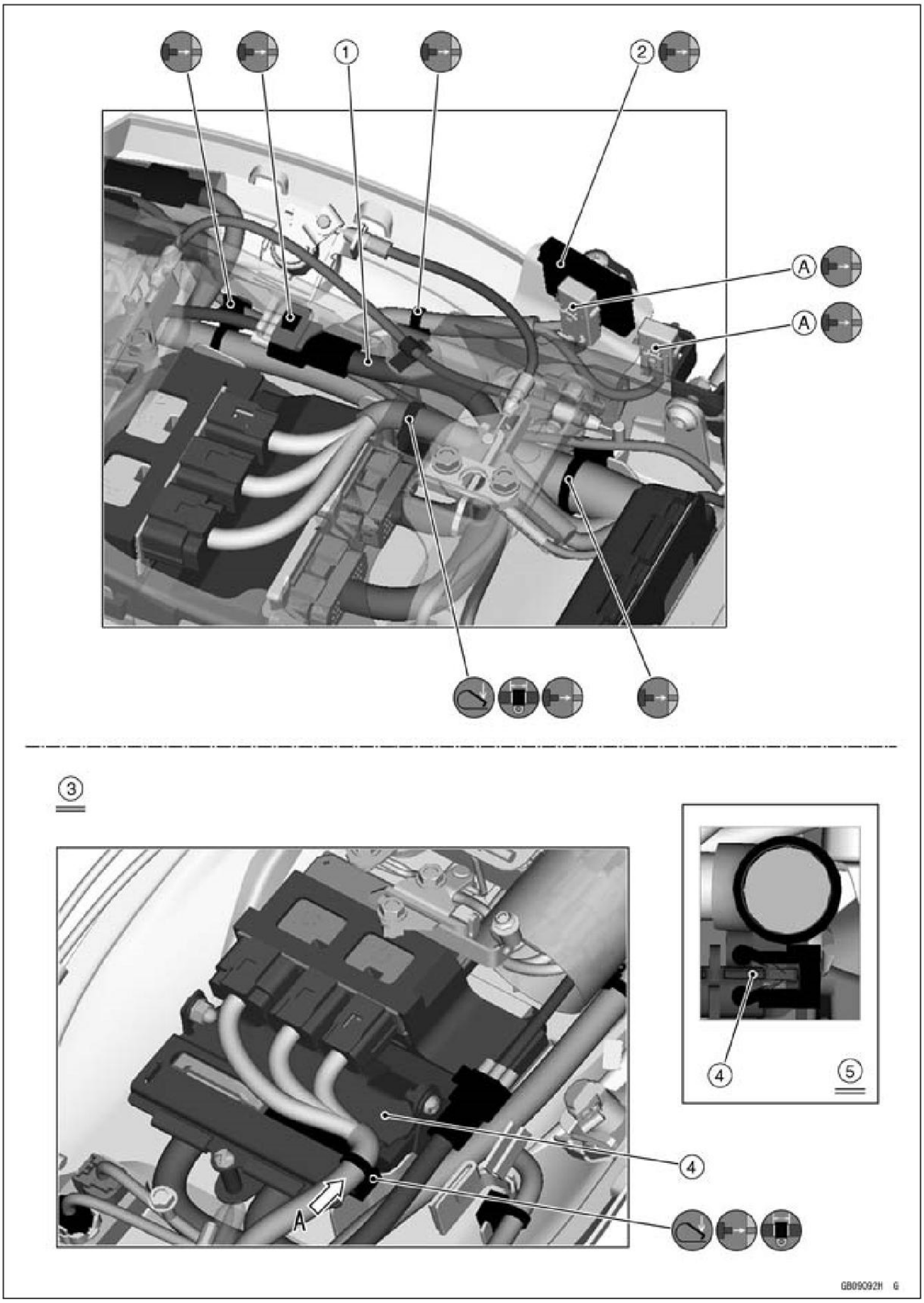
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

A: Japan Model Only
1. Pad (Install the pad aligning its shape with the rear fender.)
2. ABS Self-Diagnosis System Connector (ABS Equipped Models)
3. ABS Self-Diagnosis System Lead (ABS Equipped Models)
4. Kawasaki Diagnostic System Connector
5. Kawasaki Diagnostic System Lead
6. ECU Connectors
7. Relay Box Connectors
8. Battery Positive (+) Cable

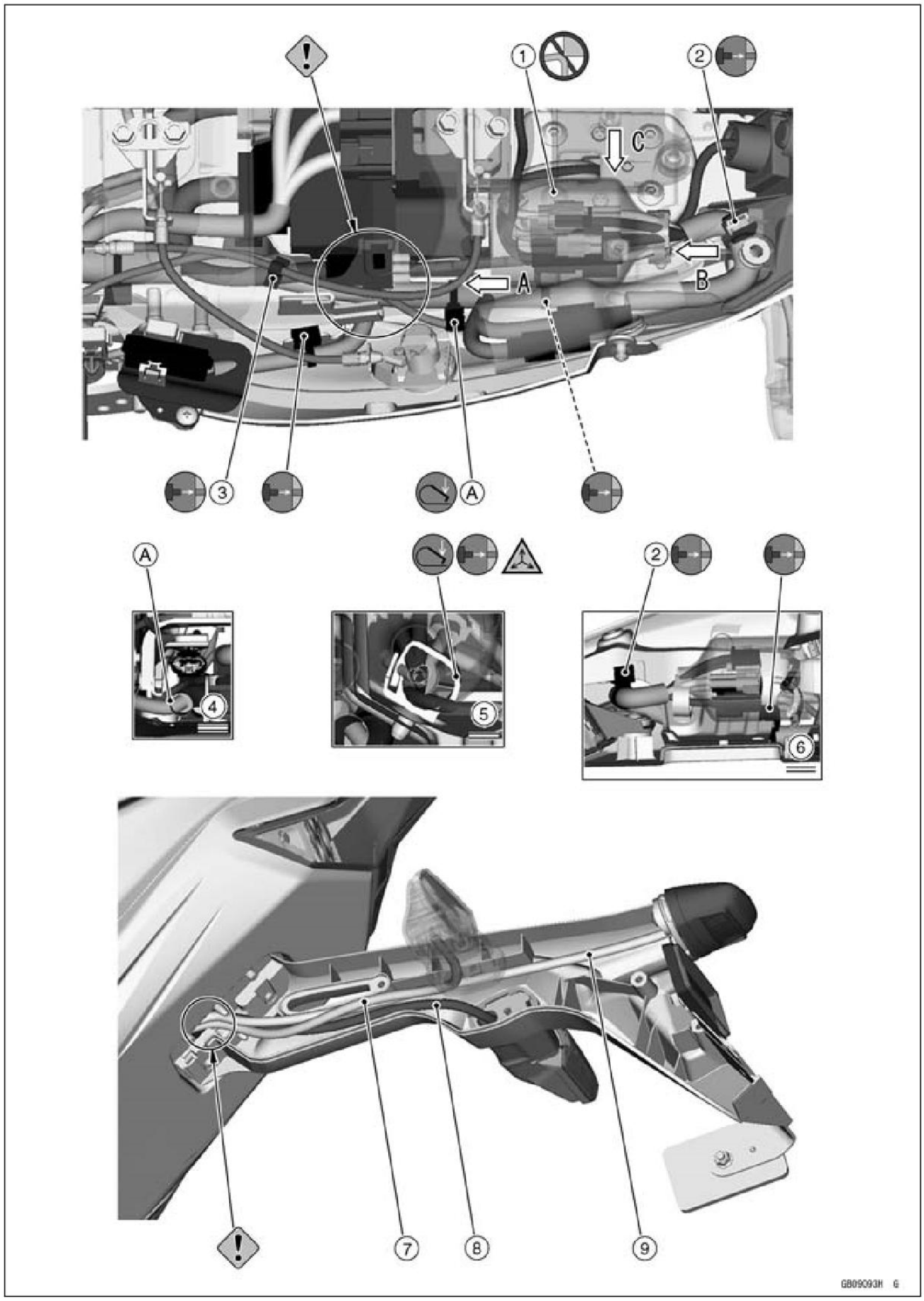
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

A: Japan Model Only
1. Brake/Tail Light Lead
2. Fuse Box for ABS (ABS Equipped Models) (Insert it to the bracket.)
3. Guard [4] Equipped Models
4. Guard
5. Viewed from A

## Cable, Wire, and Hose Routing

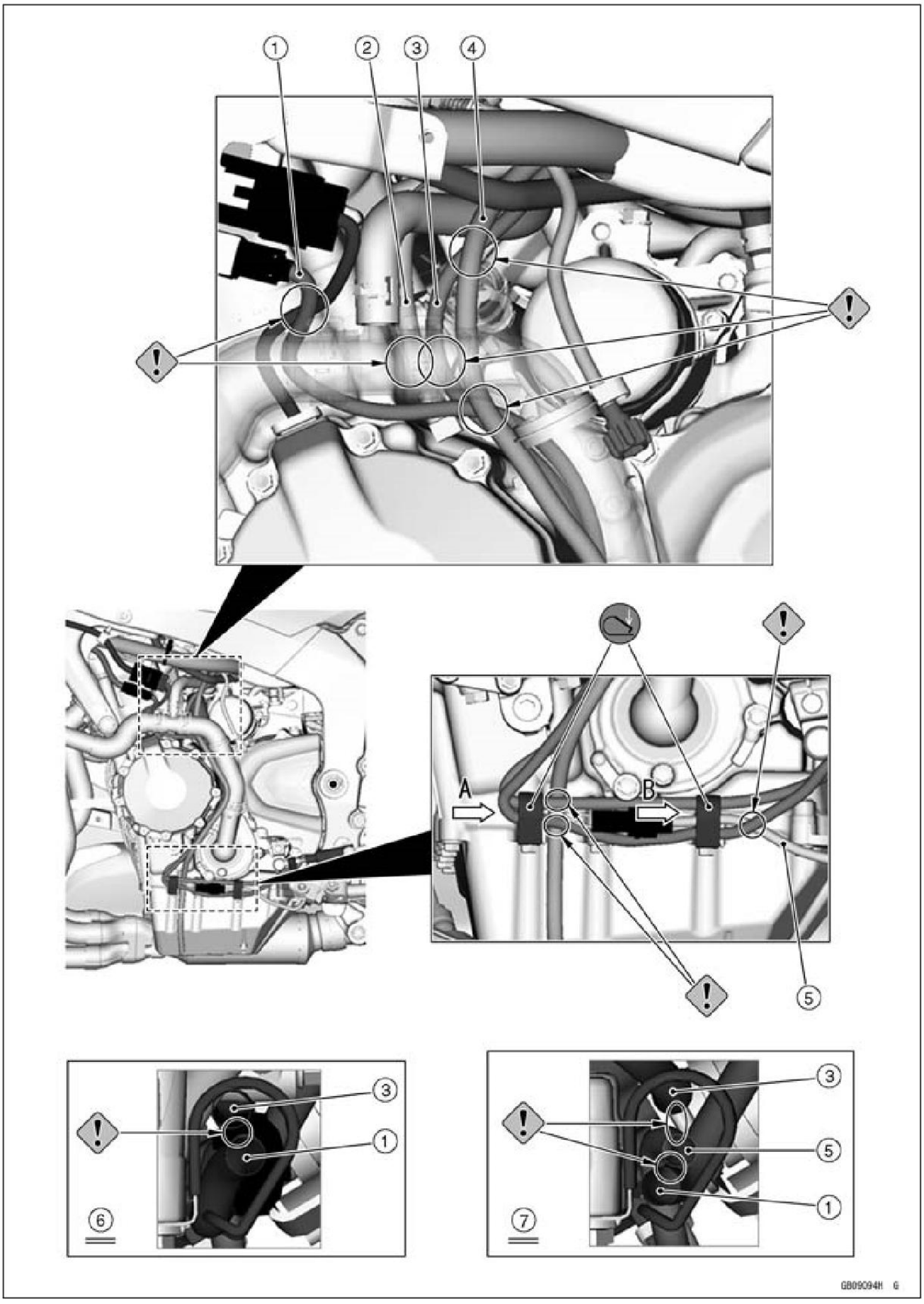


## Cable, Wire, and Hose Routing

A: Japan Model Only

1. Cover the rear right turn signal light connector, rear left turn signal light connector, license plate light connector, brake/tail light connector and exhaust butterfly valve actuator connectors with the dust cover. Place the dust cover between the rear frame and rear fender so that any leads does not contact to the rear frame.
2. Clamp (Hold the main harness to the rear frame.)
3. Clamp (Hold the rear seat lock cable to the rear frame.)
4. Viewed from A
5. Viewed from B
6. Viewed from C
7. Rear Left Turn Signal Light Lead
8. Rear Right Turn Signal Light Lead
9. License Plate Light Lead

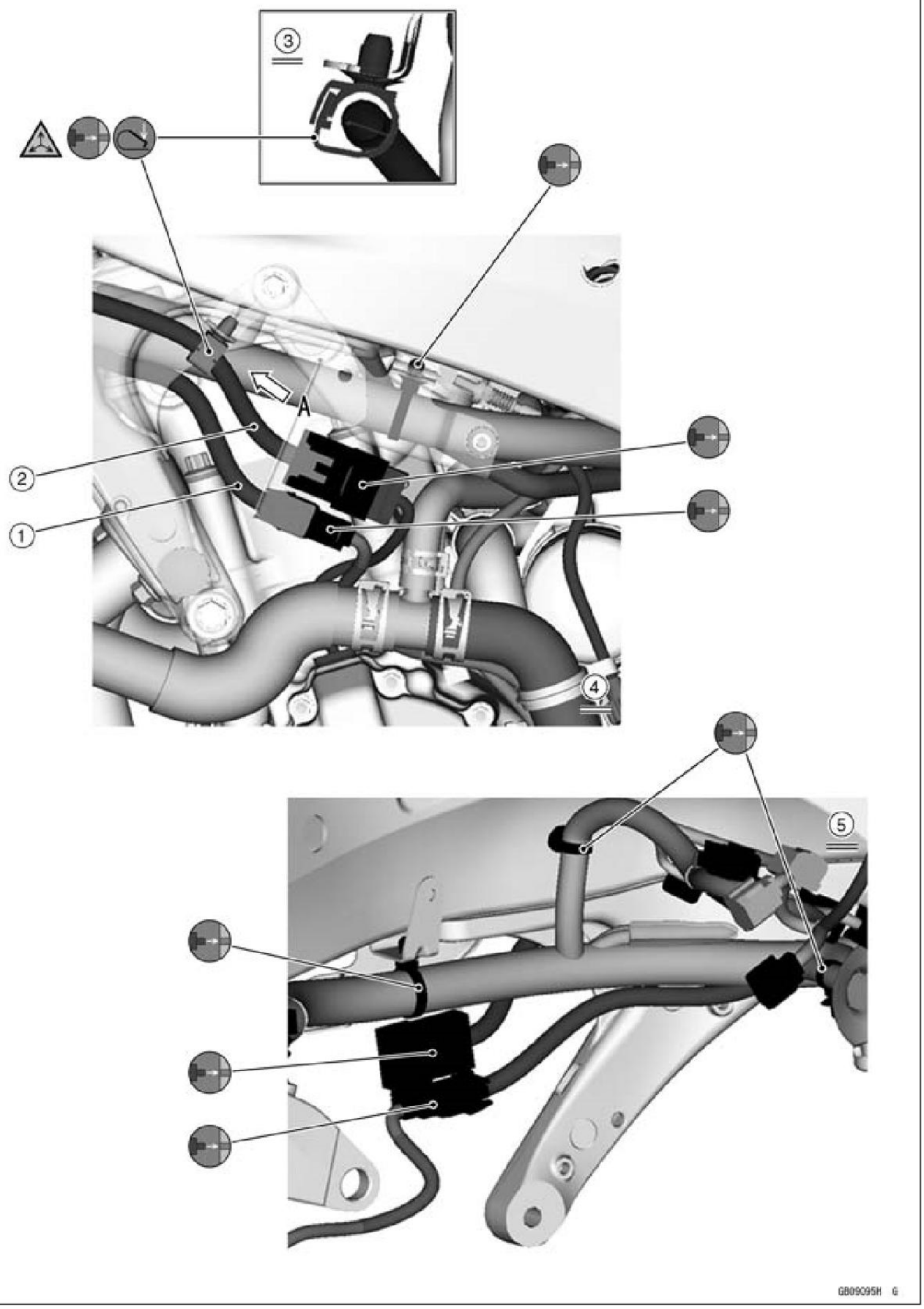
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Quick Shifter Sensor Lead
2. Air Cleaner Drain Hose
3. Gear Position Switch Lead
4. Fuel Tank Drain Hose
5. Side Stand Switch Lead
6. Viewed from A
7. Viewed from B

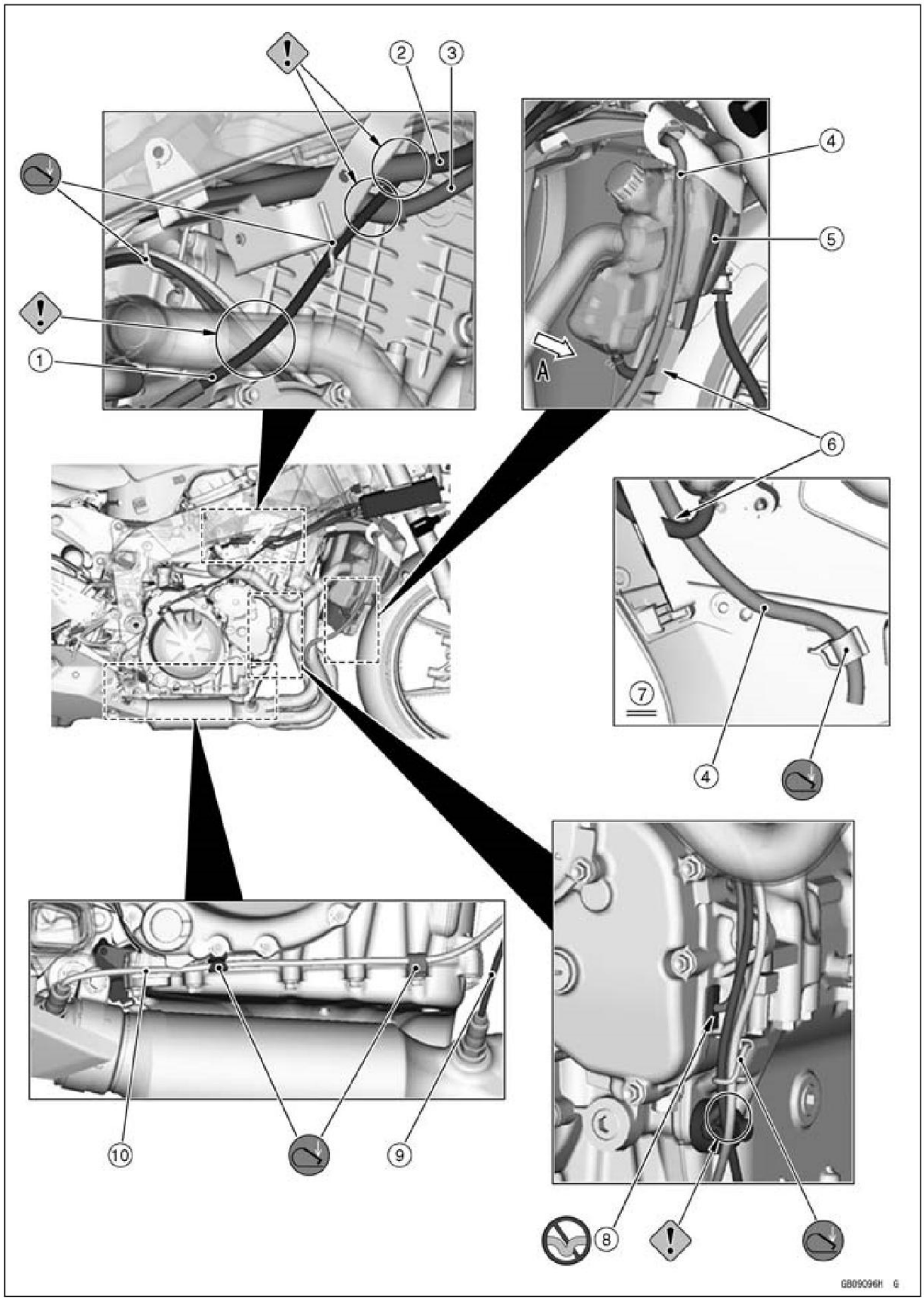
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Quick Shifter Sensor Lead
2. Alternator Lead
3. Viewed from A
4. Viewed from Outside of the Vehicle
5. Viewed from Inside of the Vehicle

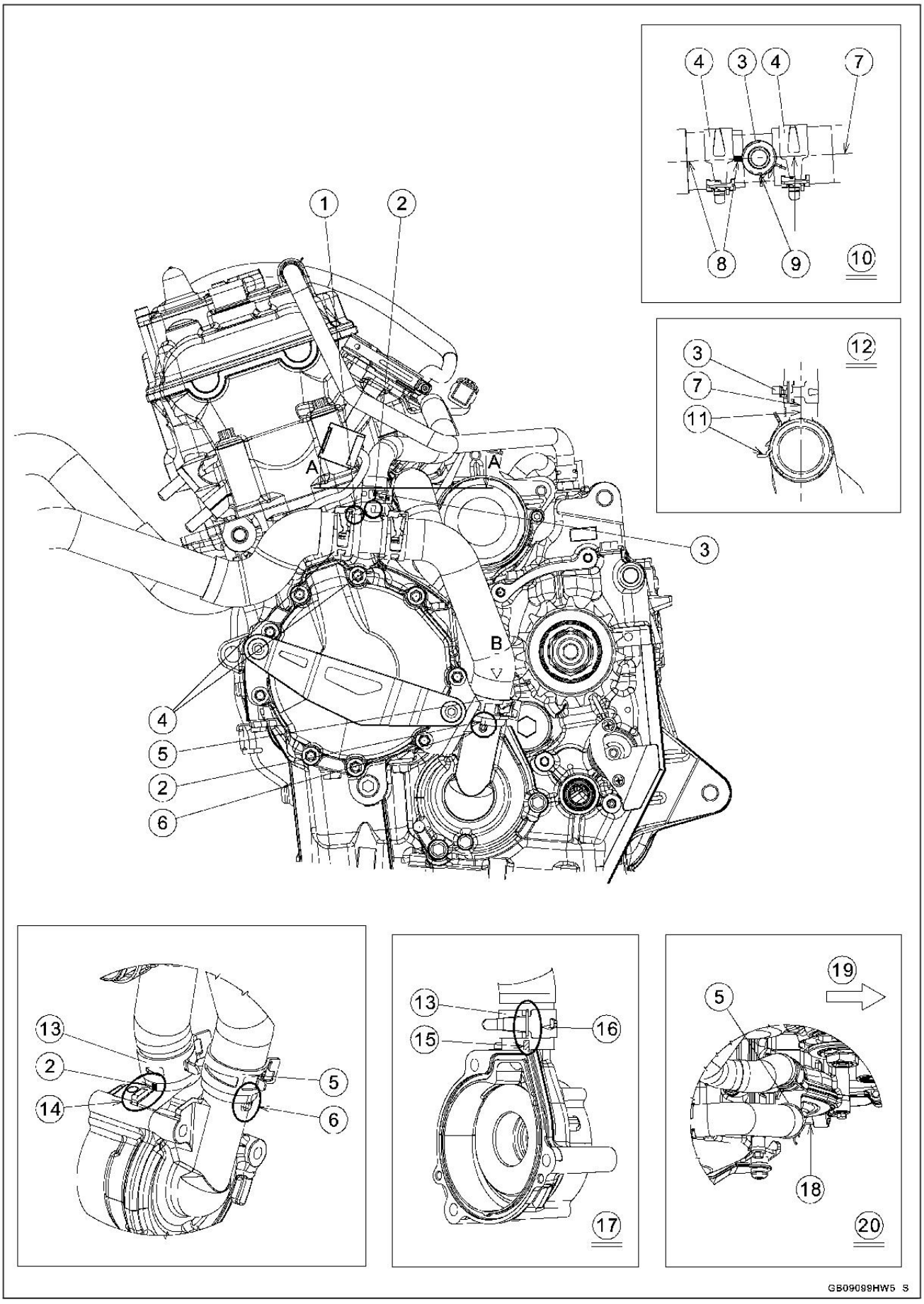
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Clutch Cable
2. Fuel Tank Breather Hose (Other than US and CA Models)
3. Purge Hose (Purge Valve – Throttle Body Assy) (Other than US and CA Models)
4. Reserve Tank Overflow Hose
5. Radiator Overflow Hose
6. Run the radiator overflow hose through the hole of the pad.
7. Viewed from A
8. Do not allow excess slack on the crankshaft sensor lead at the front side.
9. Front Oxygen Sensor Lead
10. Rear Oxygen Sensor Lead

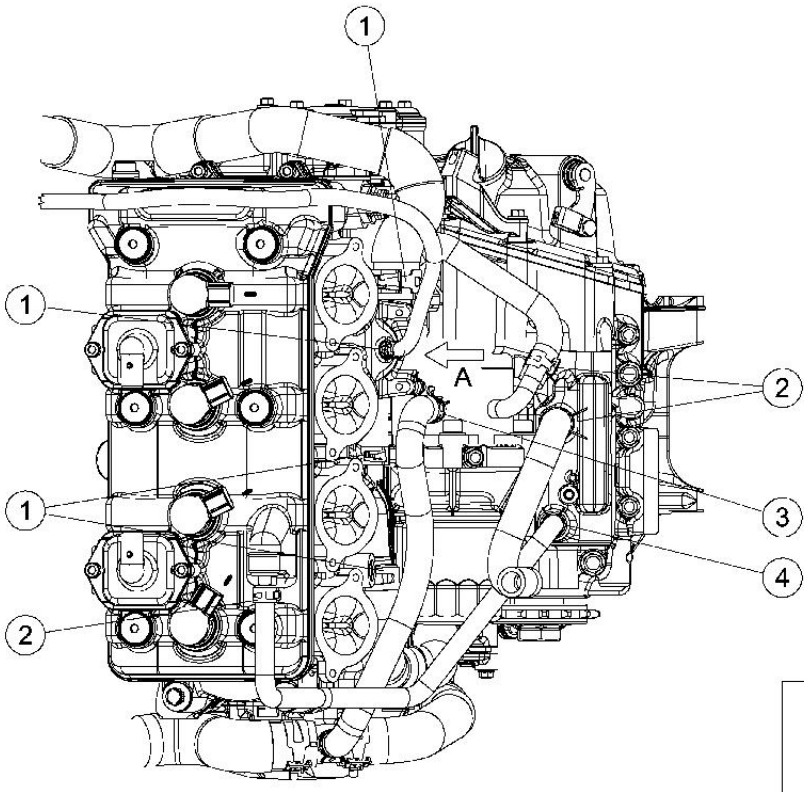
## Cable, Wire, and Hose Routing

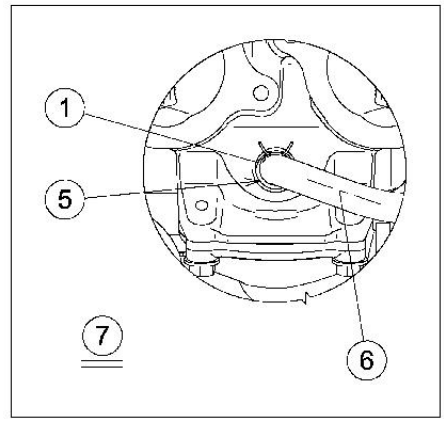


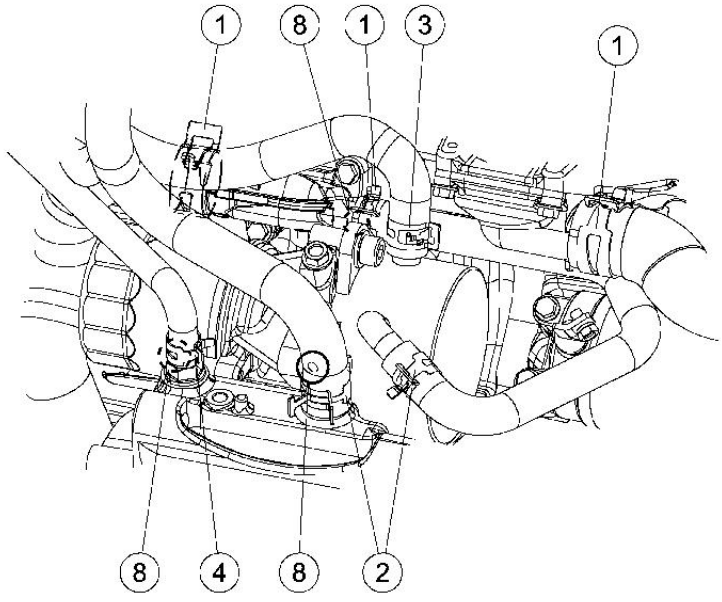
## Cable, Wire, and Hose Routing

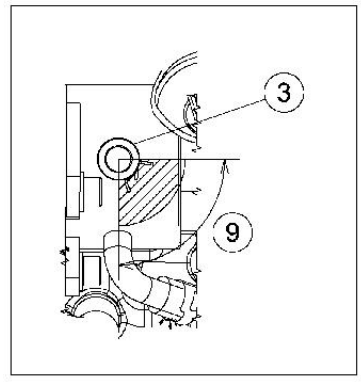
1. Green Paint Mark
2. White Paint Mark
3. Clamp (Face the knob to the left and align the knob and white paint mark.)
4. Clamps (see [12])
5. Clamp (see [20])
6. Align the white paint mark of the water hose with the projection on the water pump cover.
7. Center line of the Water Hose
8. Align the green paint mark horizontally with the centerline of the water hose.
9. Align the white paint mark vertically to the centerline of the water hose.
10. Section A – A
11. Align the lower knob of the clamp vertically to the centerline of the water hose.
12. Details for Clamps
13. Clamp (see [17])
14. Align the white paint mark of the water hose with the projection on the water pump body.
15. Yellow Paint Mark
16. Align the right knob of the clamp with yellow paint mark.
17. Details for Clamp
18. Face the knob of the clamp toward the rear side of the vehicle.
19. Rear Side of the Vehicle
20. Viewed from B

## Cable, Wire, and Hose Routing



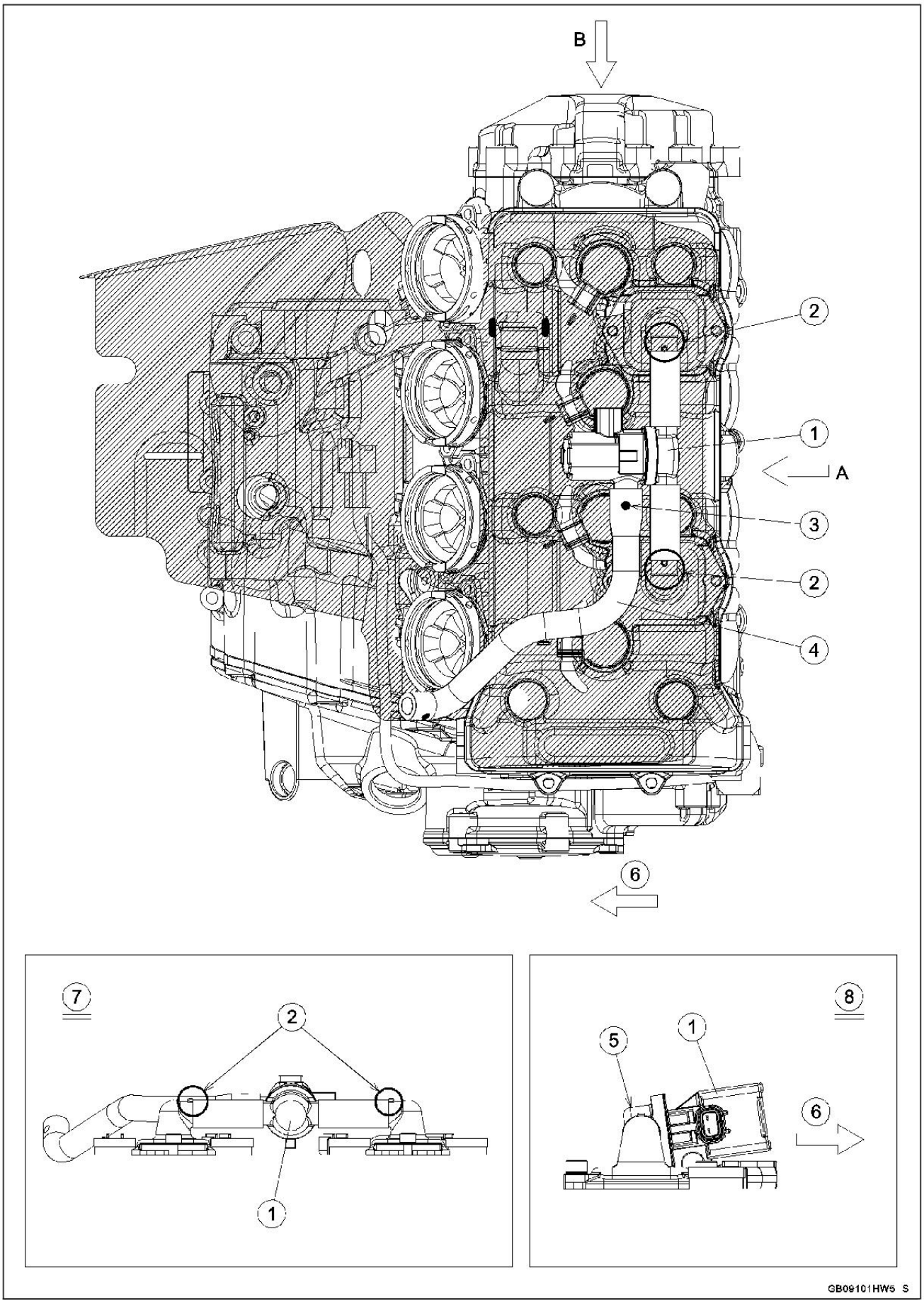




GB09100HW5 S

## Cable, Wire, and Hose Routing

1. Clamps (Face the knob to the upward.)
2. Clamps (Face the knob to the backward.)
3. Clamp (Face the knob toward the range from back to right.)
4. Clamp (Face the knob to the right.)
5. Insert the bent side of the air bleeder hose into the engine.
6. Run the straight side of the air bleeder hose to the right as shown.
7. Viewed from A
8. White Paint Marks
9. Range

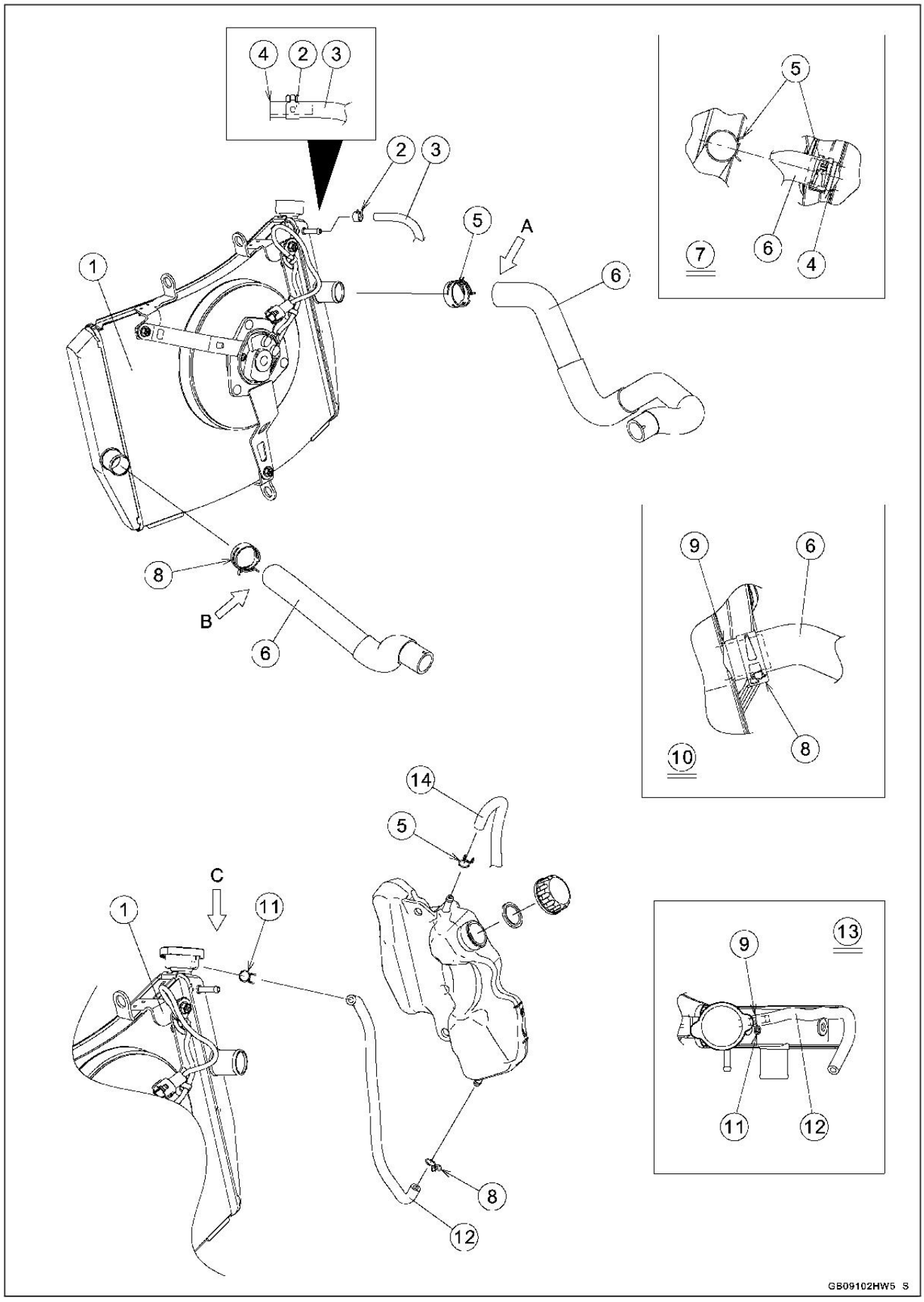
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

1. Air Switching Valve
2. Install the air switching hose so that touch the projection of the air suction valve cover.
3. White Paint Mark
4. Air Switching Valve Hose (Face the white paint mark to the upward.)
5. Tilt the air switching valve backward as shown.
6. Rear Side of the Vehicle
7. Viewed from A
8. Viewed from B

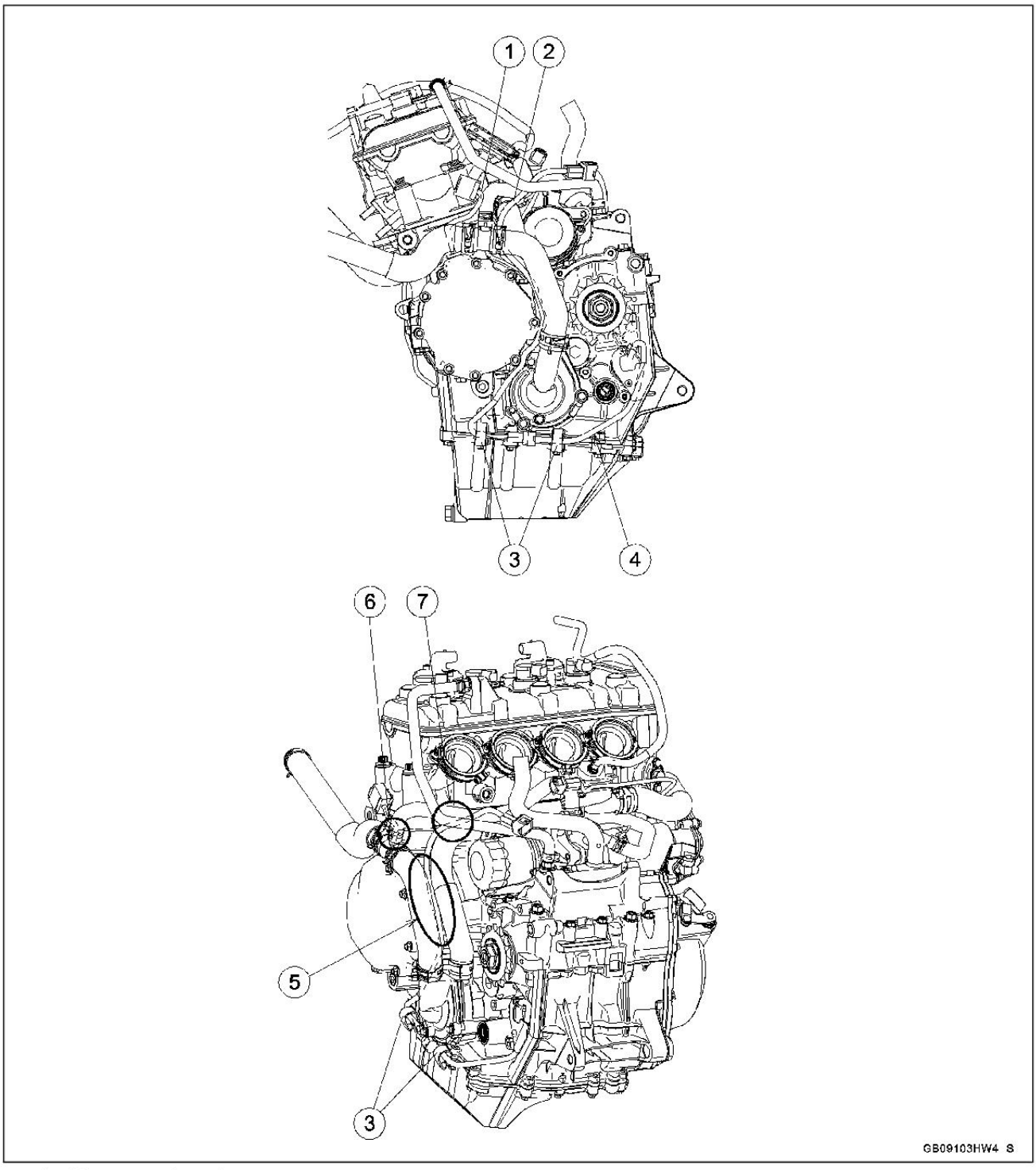
## Cable, Wire, and Hose Routing



## Cable, Wire, and Hose Routing

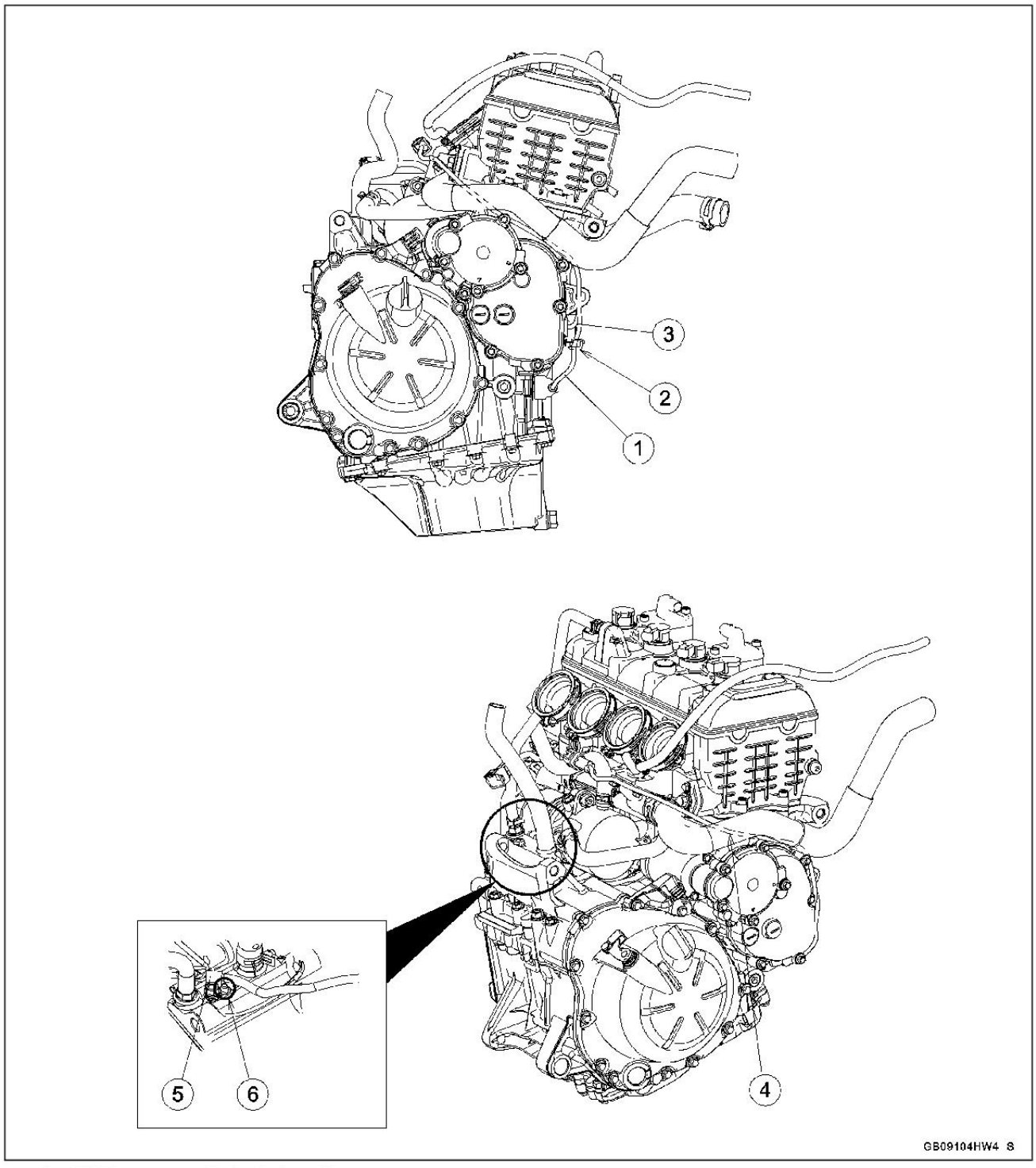
1. Radiator
2. Clamp (Face the knob to the right.)
3. Air Bleeder Hose
4. Insert the hoses into the radiator until it stops.
5. Clamps (Face the knob to the outside.)
6. Water Hoses
7. Viewed from A
8. Clamps (Face the knob to the downward.)
9. Insert the hoses to the pipe step.
10. Viewed from B
11. Clamp (Face the knob to the backward.)
12. Radiator Overflow Hose
13. Viewed from C
14. Reserve Tank Overflow Hose

## Cable, Wire, and Hose Routing



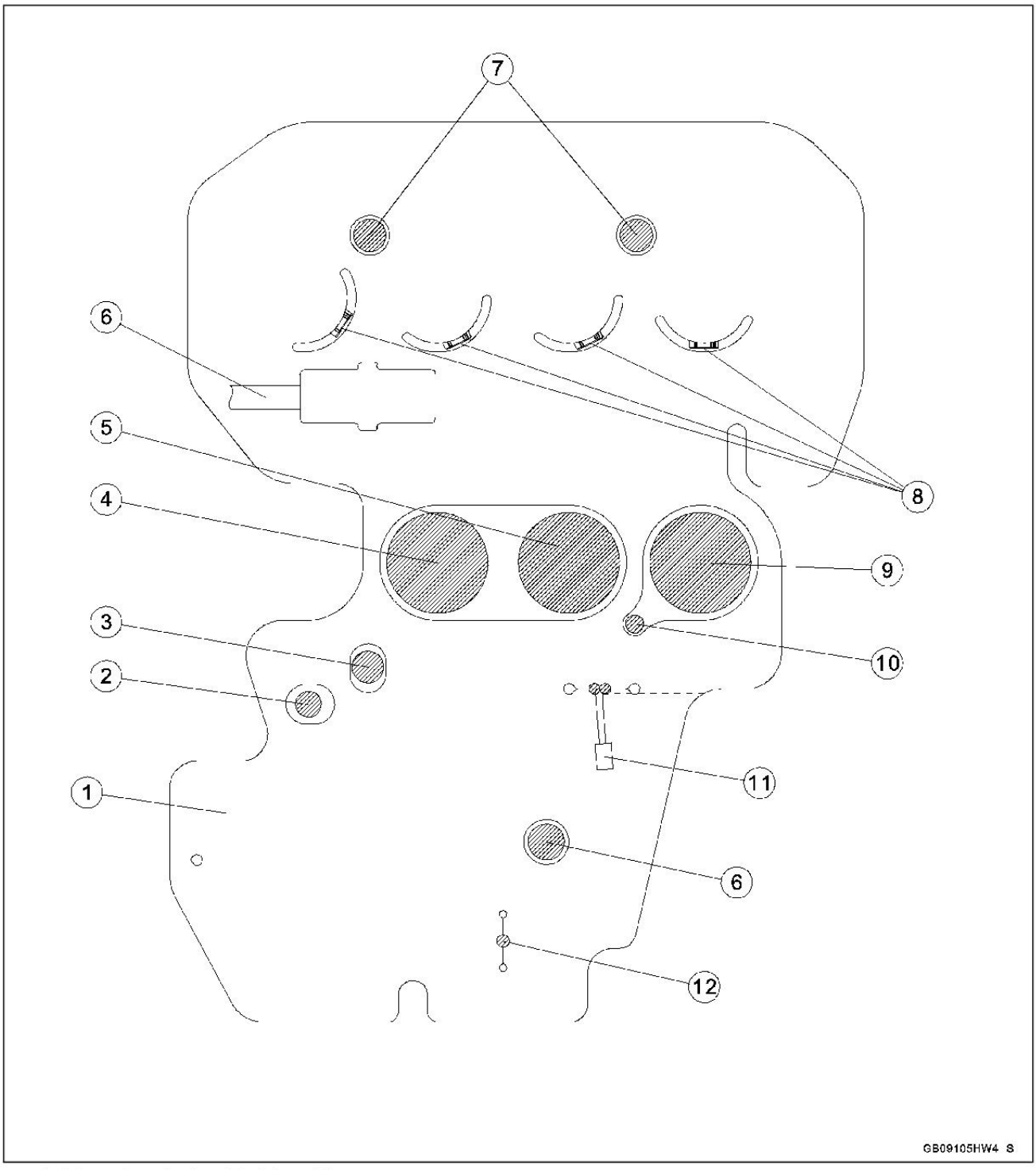

1. Alternator Lead
2. Gear Position Switch Lead
3. Clamps
4. Do not allow excess slack on the gear position switch lead between the switch and clamp.
5. Run the gear position switch lead between the water hoses.
6. Run the gear position switch lead between the water hoses.
7. Run the gear position switch lead between the water hose and engine.

## Cable, Wire, and Hose Routing



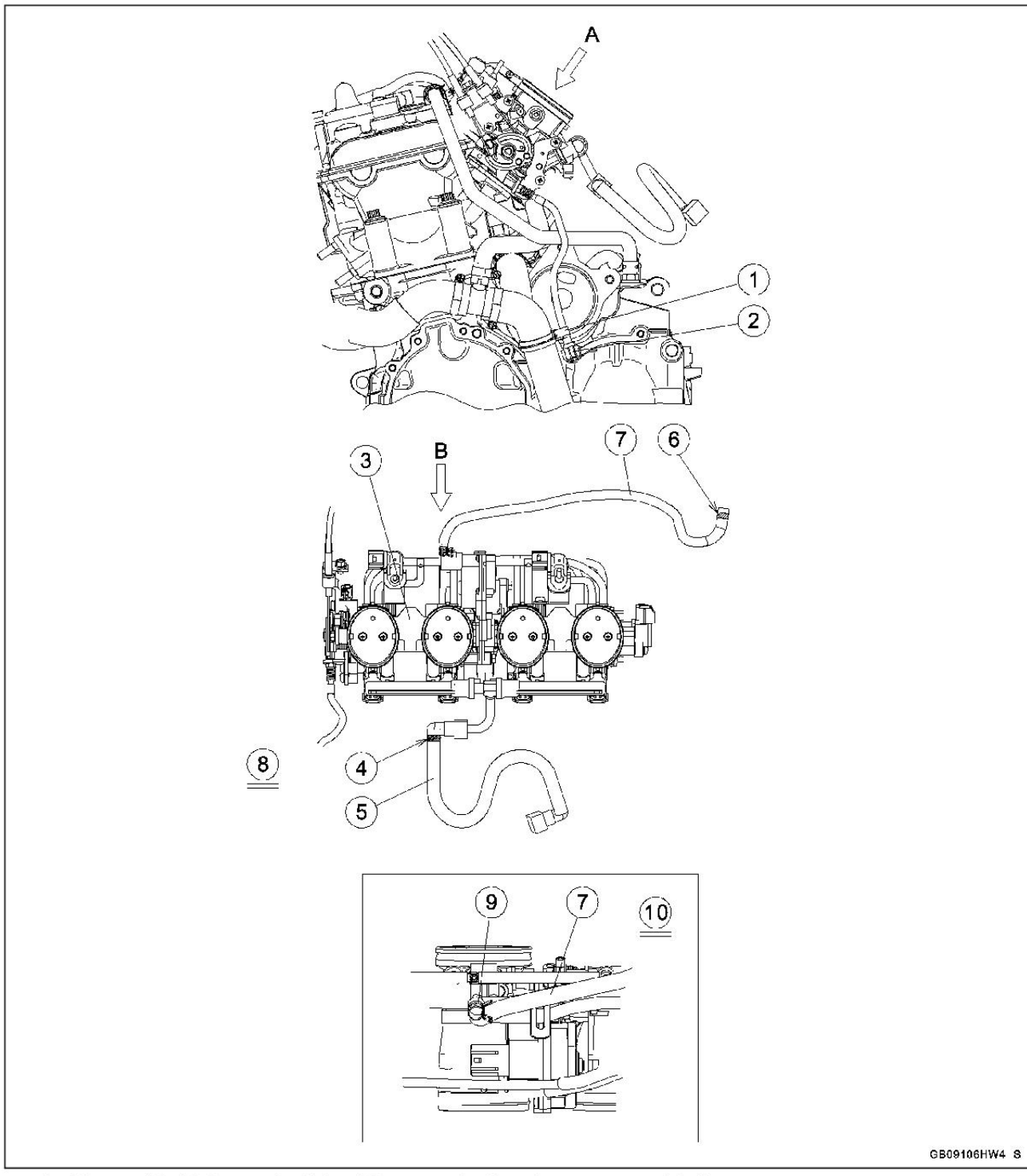

1. Oil Pressure Switch Lead
2. Clamp
3. Crankshaft Sensor Lead
4. Run the oil pressure switch lead and crankshaft sensor lead between the water hose and engine.
5. Engine Ground Terminal
6. Install the engine ground terminal so that rest it against the stopper.

## Cable, Wire, and Hose Routing




1. Heat Insulation Rubber Plate
2. Gear Position Switch Lead
3. Water Temperature Sensor
4. Throttle Body Assy Holder #2
5. Throttle Body Assy Holder #3
6. Breather Hoses
7. Air Suction Valve Covers
8. Stick Coil Connectors
9. Throttle Body Assy Holder #4
10. Air Bleeder Hose (Thermostat Housing)
11. Crankshaft Sensor Lead
12. Battery Negative (–) Cable

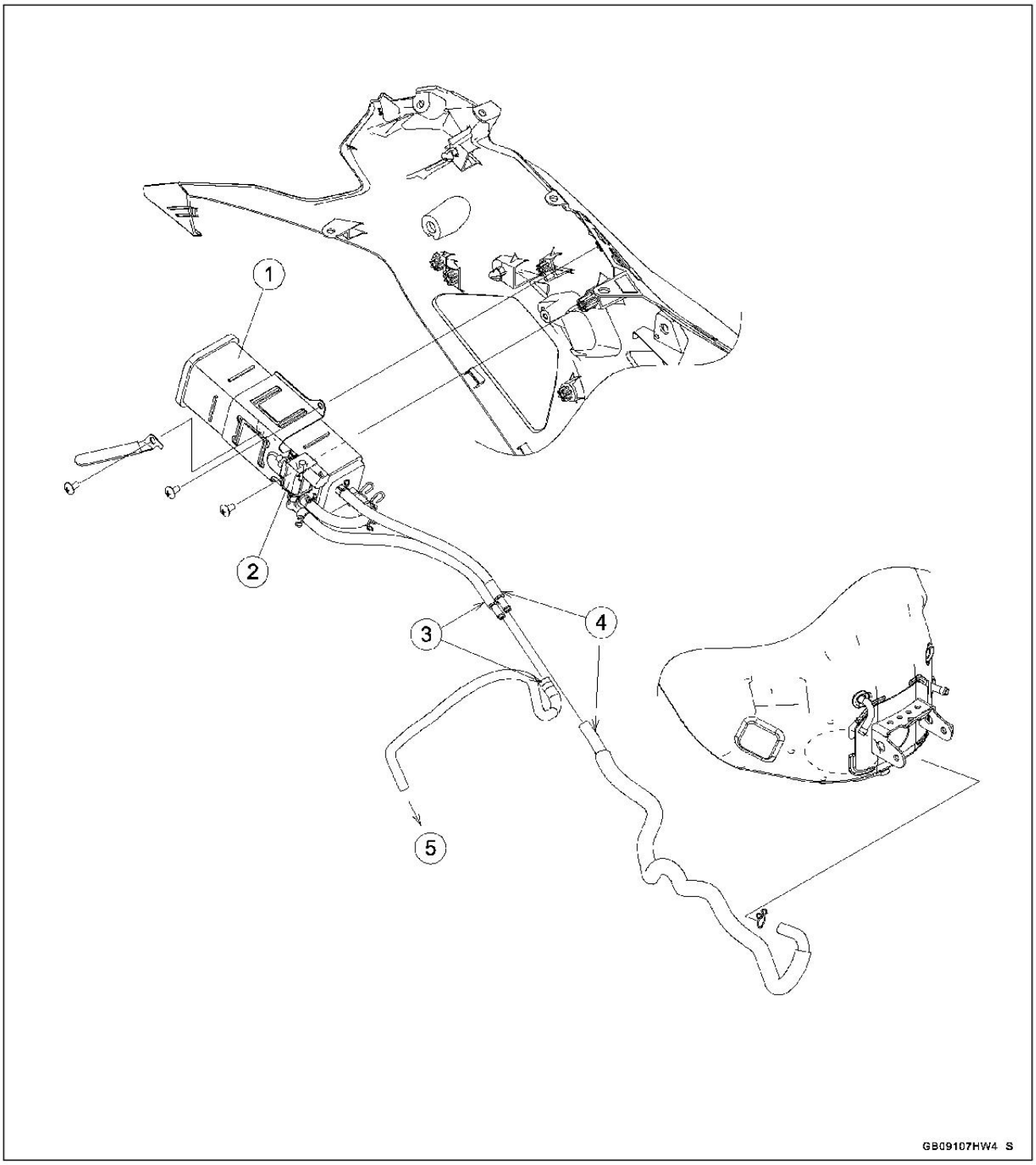
## Cable, Wire, and Hose Routing




1. Clamp (Hold the end of the idle speed adjusting screw cable.)
2. Idle Speed Adjusting Screw
3. Throttle Body Assy
4. Yellow Paint Mark
5. Fuel Hose (Connect the fuel hose with its paint mark side to the outlet pipe on the throttle body assy.)
6. Green Paint Mark
7. Purge Valve Hose (Other than US and CA Models) (Connect the purge valve hose with its no paint mark end to the throttle body assy.)
8. Viewed from A
9. Clamp (Face the knob to the right.)
10. Viewed from B

## Cable, Wire, and Hose Routing

### Other than US and CA Models

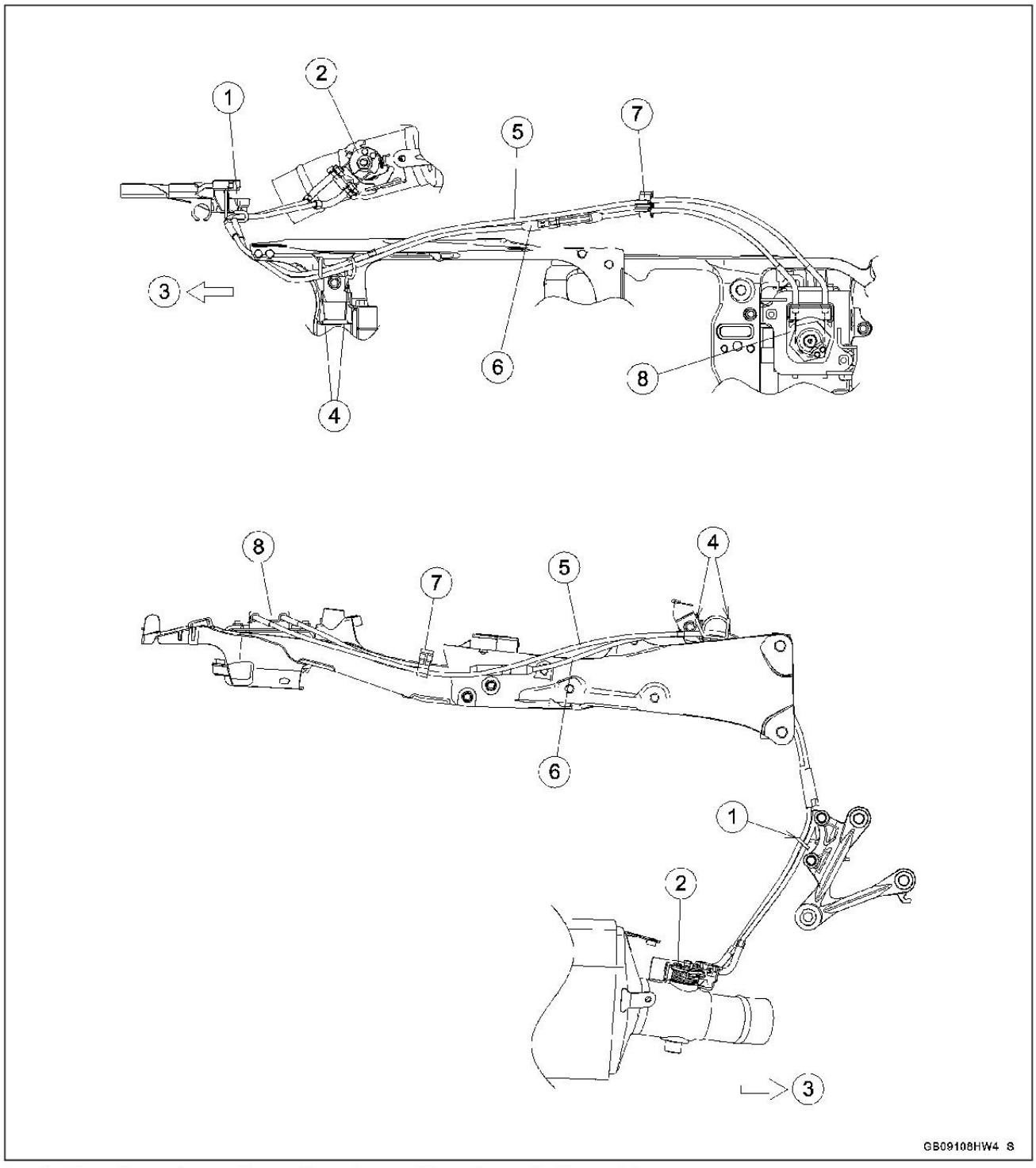



**NOTE**

- *Insert each hose all the way until it stops.*
- *All clamps should position beyond the ridge of the fitting and also its tabs positioned as shown.*
- *All clamps should position with its tabs positioned as shown.*
- *Be sure to each hose does not blocked by a pinched or kinked.*

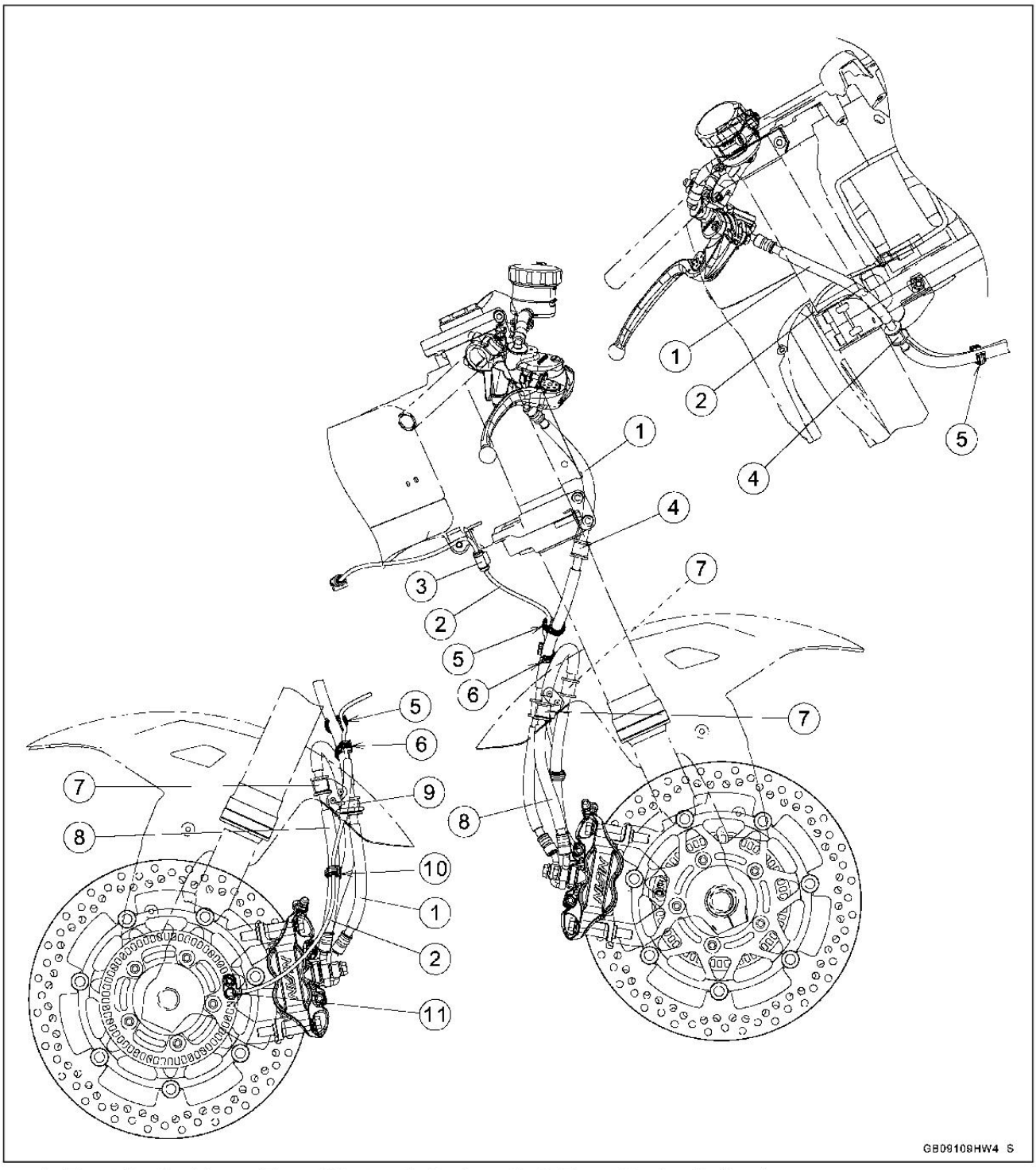
1. Canister
2. Purge Valve
3. Green Paint Marks (Purge Hose)
4. Blue Paint Marks (Breather Hose)
5. To Throttle Body Assy

## Cable, Wire, and Hose Routing



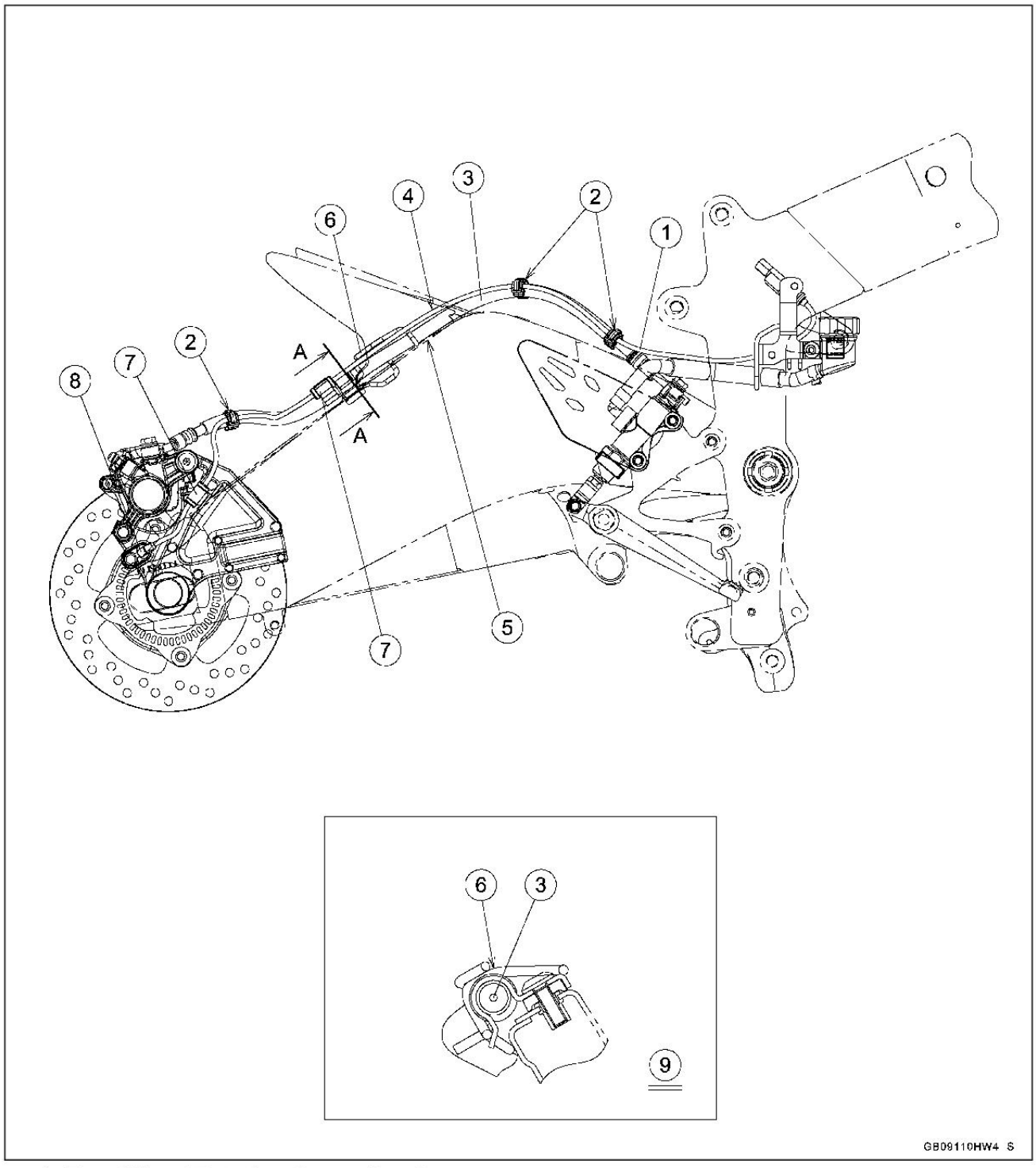

1. Run the exhaust butterfly valve cables through the guide.
2. Exhaust Butterfly Valve Pulley
3. Front
4. Run the exhaust butterfly valve cables through the guides on the bracket.
5. Exhaust Butterfly Valve Cable (Close Cable)
6. Exhaust Butterfly Valve Cable (Open Cable)
7. Clamp (Hold the exhaust butterfly valve cables. The open side of the clamp faces right.)
8. Exhaust Butterfly Valve Actuator

## Cable, Wire, and Hose Routing




1. Front Brake Hose (Front Master Cylinder – Left Front Brake Caliper)
2. Front Wheel Rotation Sensor Lead
3. Clamp (Hold the front wheel rotation sensor.)
4. Clamp (Hold the front brake hose [1].)
5. Clamp (Hold the front brake hose [1] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the upward.)
6. Clamp (Hold the front brake hose [1] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the backward.)
7. Clamps (Hold the front brake hose [8].)
8. Front Brake Hose (Front Brake Calipers)
9. Clamp (Hold the front brake hose [1] and front wheel rotation sensor lead.)
10. Clamp (Hold the front brake hose [8] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the backward.)
11. Front Wheel Rotation Sensor

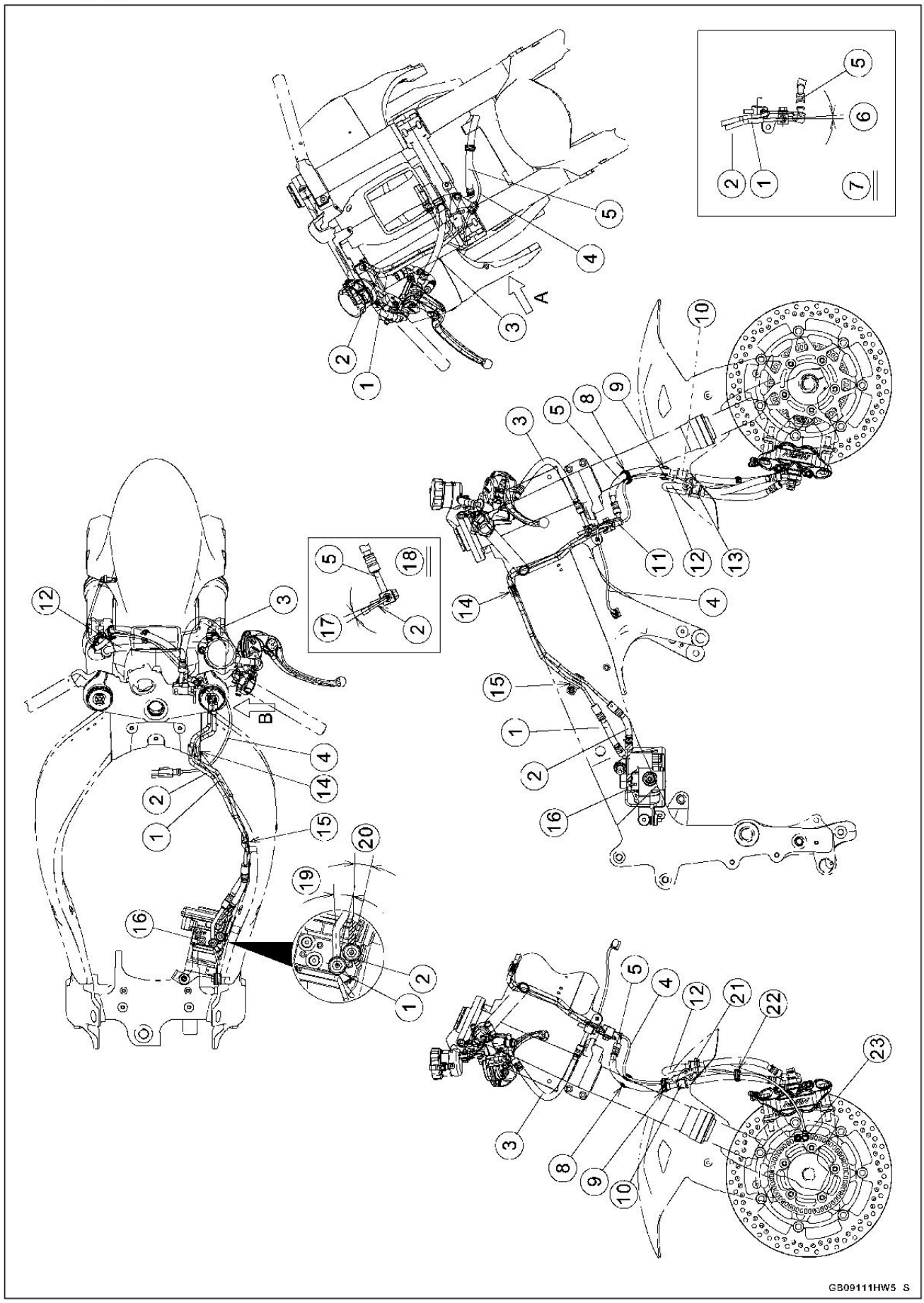
## Cable, Wire, and Hose Routing




1. Rear Wheel Rotation Sensor Lead
2. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the downward.)
3. Rear Brake Hose
4. Run the rear wheel rotation sensor lead to the outside of the mud guard.
5. Run the rear brake hose to the inside of the mud guard.
6. Clamps (Hold the rear brake hose.)
7. Clamps (Hold the rear wheel rotation sensor lead.)
8. Rear Wheel Rotation Sensor
9. Section A – A

## Cable, Wire, and Hose Routing

### ABS Equipped Models

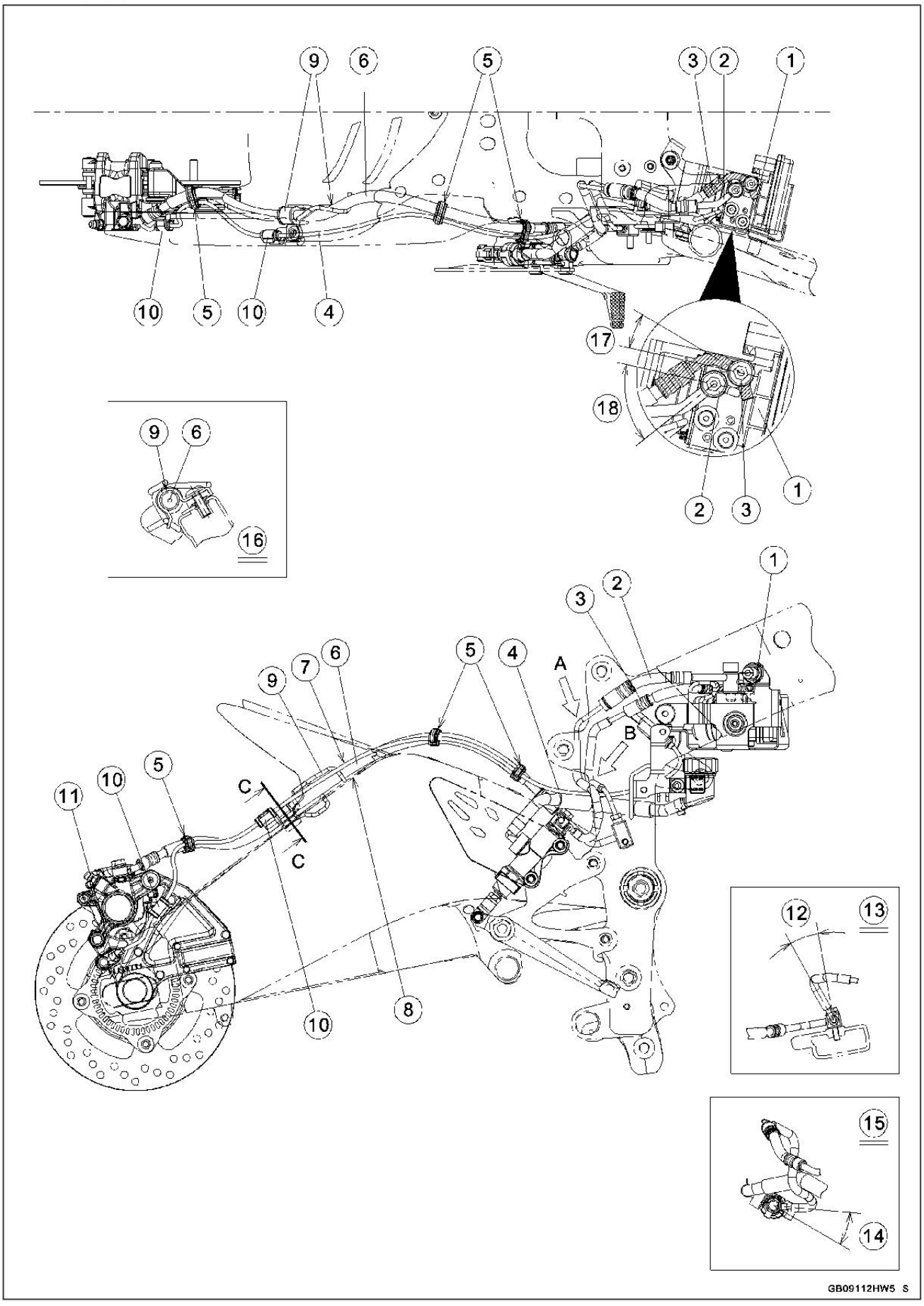


## Cable, Wire, and Hose Routing

1. Front ABS Brake Pipe (ABS Hydraulic Unit – Front Brake Hose [3])
2. Front ABS Brake Pipe (ABS Hydraulic Unit – Front Brake Hose [5])
3. Front Brake Hose (Front Master Cylinder – Front ABS Brake Pipe [2])
4. Front Wheel Rotation Sensor Lead
5. Front Brake Hose (Front ABS Brake Pipe [1] – Left Front Brake Caliper)
6. 3.7°
7. Viewed from A
8. Clamp (Hold the front brake hose [5] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the upward.)
9. Clamp (Hold the front brake hose [5] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the inside.)
10. Clamp (Hold the front brake hose [5].)
11. Clamp (Hold the front wheel rotation sensor.)
12. Front Brake Hose (Front Brake Calipers)
13. Clamp (Hold the front brake hose [12].)
14. Damper (Hold the front ABS brake pipes.)
15. Clamps (Hold the front ABS brake pipes.)
16. ABS Hydraulic Unit
17. 7.7°
18. Viewed from B
19. 15.1°
20. 10.6°
21. Clamp (Hold the front brake hose [12] and front wheel rotation sensor lead.)
22. Clamp (Hold the front brake hose [5] and front wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the backward.)
23. Front Wheel Rotation Sensor

## Cable, Wire, and Hose Routing

### ABS Equipped Models



## Cable, Wire, and Hose Routing

1. ABS Hydraulic Unit
2. Rear ABS Brake Pipe (ABS Hydraulic Unit – Rear Master Cylinder)
3. Rear ABS Brake Pipe (ABS Hydraulic Unit – Rear Brake Hose)
4. Rear Wheel Rotation Sensor Lead
5. Clamps (Hold the rear brake hose and rear wheel rotation sensor lead at the white mark on the lead. Face the open side of the clamp to the downward.)
6. Rear Brake Hose
7. Run the rear wheel rotation sensor lead to the outside of the mud guard.
8. Run the rear brake hose to the inside of the mud guard.
9. Clamps (Hold the rear brake hose.)
10. Clamps (Hold the rear wheel rotation sensor lead.)
11. Rear Wheel Rotation Sensor
12. About 19.1°
13. Viewed from A
14. About 25°
15. Viewed from B
16. Section C – C
17. 17.9°
18. 51°

## Troubleshooting Guide

**NOTE**

○*Refer to the Self-Diagnosis System chapter for most of DFI trouble shooting guide.*

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

### Engine Doesn't Start, Starting Difficulty:

**Starter motor not rotating:**
- Ignition and engine stop switch not on
- Starter lockout switch or gear position sensor trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Starter button not contacting
- Starter system wiring shorted or open
- Ignition switch trouble
- Engine stop switch trouble
- Main or ignition fuse blown
- Rectifier trouble

**Starter motor rotating but engine doesn't turn over:**
- Vehicle-down sensor (DFI) coming off
- Immobilizer system trouble (Equipped Models)
- Starter clutch trouble
- Starter idle gear trouble

**Engine won't turn over:**
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure
- Balancer bearing seizure

**No fuel flow:**
- No fuel in tank
- Fuel pump trouble
- Fuel pump relay not contacting or operating
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

**No spark; spark weak:**
- Vehicle-down sensor (DFI) coming off
- Ignition switch not on
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact
- Stick coil trouble
- ECU trouble
- Crankshaft sensor trouble
- Ignition switch or engine stop switch shorted

**Fuel/air mixture incorrect:**
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Leak from oil filler plug, crankcase breather hose or air cleaner drain hose.

**Compression Low:**
- Spark plug loose
- Cylinder head not sufficiently tightened down
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- No valve clearance
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

### Poor Running at Low Speed:

**Spark weak:**
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Stick coil trouble
- Stick coil shorted or not in good contact
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor trouble

**Fuel/air mixture incorrect:**
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Fuel to injector insufficient
- Fuel line clogged
- Throttle body assy holder loose
- Air cleaner housing loose

**Compression low:**
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance

Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worn

**Other:**
ECU trouble
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble

## Poor Running or No Power at High Speed:

**Firing incorrect:**
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact
Stick coil trouble
ECU trouble

**Fuel/air mixture incorrect:**
Air cleaner clogged, poorly sealed, or missing
Throttle body assy holder loose
Air cleaner housing loose
Water or foreign matter in fuel
Fuel to injector insufficient
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble

**Compression low:**
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)

**Knocking:**
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
ECU trouble

**Other:**
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Camshaft cam worn
Air suction valve trouble
Air switching valve trouble
Muffler overheating

## Overheating:

**Firing incorrect:**
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
ECU trouble

**Muffler overheating:**
Do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
Do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
Do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
Do not coast the motorcycle with the ignition switch off (Turn the ignition switch on and run the engine)
ECU trouble

**Fuel/air mixture incorrect:**
Throttle body assy holder loose
Air cleaner housing loose
Air cleaner poorly sealed, or missing
Air cleaner clogged

**Compression high:**
Carbon built up in combustion chamber

**Engine load faulty:**
Brake dragging
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble

**Lubrication inadequate:**
Engine oil level too low
Engine oil poor quality or incorrect

**Oil cooler incorrect:**
Oil cooler clogged

**Water temperature meter incorrect:**
Water temperature meter broken
Water temperature sensor broken

## Troubleshooting Guide

**Coolant incorrect:**
- Coolant level too low
- Coolant deteriorated
- Wrong coolant mixed ratio

**Cooling system component incorrect:**
- Radiator fin damaged
- Radiator clogged
- Thermostat trouble
- Radiator cap trouble
- Radiator fan relay trouble
- Fan motor broken
- Fan blade damaged
- Water pump not turning
- Water pump impeller damaged

### Over Cooling:

**Water temperature meter incorrect:**
- Water temperature meter broken
- Water temperature sensor broken

**Cooling system component incorrect:**
- Thermostat trouble

### Clutch Operation Faulty:

**Clutch slipping:**
- Friction plate worn or warped
- Steel plate worn or warped
- Clutch spring broken or weak
- Clutch hub or housing unevenly worn
- No clutch lever play
- Clutch inner cable trouble
- Clutch release mechanism trouble

**Clutch not disengaging properly:**
- Clutch plate warped or too rough
- Clutch spring compression uneven
- Engine oil deteriorated
- Engine oil viscosity too high
- Engine oil level too high
- Clutch housing frozen on drive shaft
- Clutch hub nut loose
- Sub clutch hub spline damaged
- Clutch friction plate installed wrong
- Clutch lever play excessive
- Clutch release mechanism trouble

### Gear Shifting Faulty:

**Doesn't go into gear; shift pedal doesn't return:**
- Clutch not disengaging
- Shift fork bent or seized
- Gear stuck on the shaft
- Gear positioning lever binding
- Shift return spring weak or broken
- Shift return spring pin loose
- Shift ratchet assembly spring broken
- Shift ratchet assembly broken
- Shift pawl broken

**Jumps out of gear:**
- Shift fork ear worn, bent
- Gear groove worn
- Gear dogs and/or dog holes worn
- Shift drum groove worn
- Gear positioning lever spring weak or broken
- Shift fork guide pin worn
- Drive shaft, output shaft, and/or gear splines worn

**Overshifts:**
- Gear positioning lever spring weak or broken
- Shift ratchet assembly spring weak or broken

### Abnormal Engine Noise:

**Knocking:**
- ECU trouble
- Carbon built up in combustion chamber
- Fuel poor quality or incorrect
- Spark plug incorrect
- Overheating

**Piston slap:**
- Cylinder/piston clearance excessive
- Cylinder, piston worn
- Connecting rod bent
- Piston pin, piston pin hole worn

**Valve noise:**
- Valve clearance incorrect
- Valve spring broken or weak
- Camshaft bearing worn
- Valve lifter worn

**Other noise:**
- Connecting rod small end clearance excessive
- Connecting rod big end clearance excessive
- Piston ring/groove clearance excessive
- Piston ring worn, broken, or stuck
- Piston ring groove worn
- Piston seizure, damage
- Cylinder head gasket leaking
- Exhaust pipe leaking at cylinder head connection
- Crankshaft runout excessive
- Engine mount loose
- Crankshaft bearing worn
- Primary gear worn or chipped
- Camshaft chain tensioner trouble
- Camshaft chain, sprocket, guide worn
- Air suction valve damaged
- Air switching valve damaged
- Alternator rotor loose
- Muffler overheating
- Exhaust butterfly valve cable loose

## Troubleshooting Guide

### Abnormal Drive Train Noise:

**Clutch noise:**
- Clutch damper weak or damaged
- Clutch housing/friction plate clearance excessive
- Clutch housing gear worn
- Wrong installation of outside friction plate

**Transmission noise:**
- Bearings worn
- Transmission gear worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient

**Drive line noise:**
- Drive chain adjusted improperly
- Drive chain worn
- Rear and/or engine sprocket worn
- Chain lubrication insufficient
- Rear wheel misaligned

### Abnormal Frame Noise:

**Front fork noise:**
- Oil insufficient or too thin
- Spring weak or broken

**Rear shock absorber noise:**
- Shock absorber damaged

**Disc brake noise:**
- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

**Other noise:**
- Bracket, nut, bolt, etc. not properly mounted or tightened

### Warning Indicator Light (Oil Pressure Warning) Doesn't Go OFF:

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil filter clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearing worn
- Crankshaft bearing worn
- Oil pressure switch damaged
- Wiring faulty
- Relief valve stuck open
- O-ring at the oil passage in the crankcase damaged

### Exhaust Smokes Excessively:

**White smoke:**
- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

**Black smoke:**
- Air cleaner clogged

**Brown smoke:**
- Air cleaner housing loose
- Air cleaner poorly sealed or missing

### Handling and/or Stability Unsatisfactory:

**Handlebars hard to turn:**
- Cable routing incorrect
- Hose routing incorrect
- Wiring routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

**Handlebars shakes or excessively vibrates:**
- Tire worn
- Swingarm pivot bearing worn
- Rim warped, or not balanced
- Wheel bearing worn
- Handlebar clamp bolt loose
- Steering stem nut loose
- Front, rear axle runout excessive
- Engine mount loose

**Handlebars pulls to one side:**
- Frame bent
- Wheel misalignment
- Swingarm bent or twisted
- Swingarm pivot shaft runout excessive
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level uneven

**Shock absorption unsatisfactory:**
- (Too hard)
- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Tire air pressure too high
- Front fork bent
- (Too soft)
- Tire air pressure too low
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

### Brake Doesn't Hold:

- Air in the brake line
- Pad or disc worn
- Brake fluid leakage
- Disc warped
- Contaminated pad

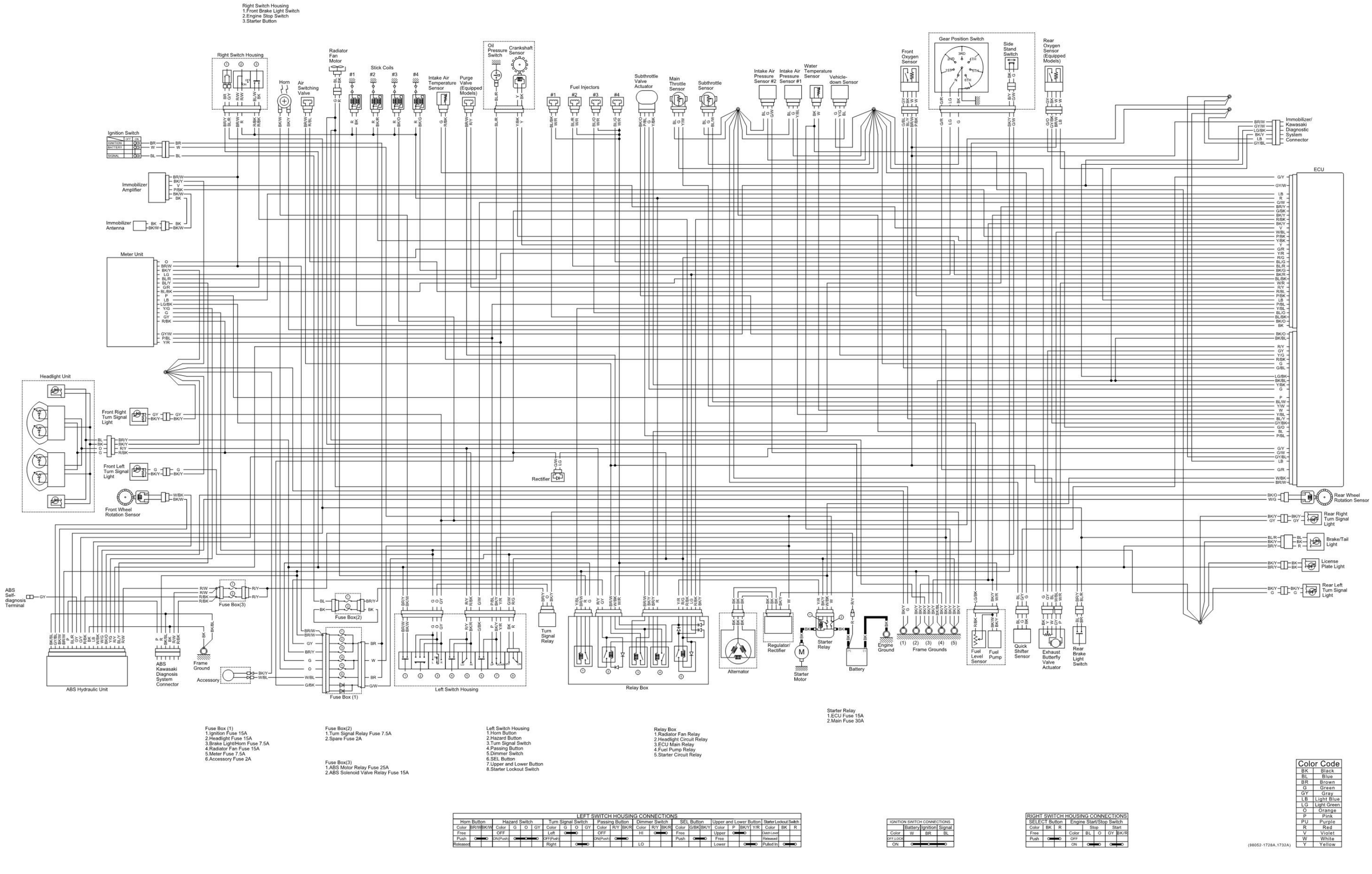
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder trouble

## Battery Trouble:

**Battery discharged:**
Charge insufficient
Battery faulty (too low terminal voltage)
Battery cable making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

**Battery overcharged:**
Alternator trouble
Regulator/rectifier trouble
Battery faulty

# ZX636J with Immobilizer




Fuse Box (1)
1.Ignition Fuse 15A
2.Headlight Fuse 15A
3.Brake Light/Horn Fuse 7.5A
4.Radiator Fan Fuse 15A
5.Meter Fuse 7.5A
6.Accessory Fuse 2A

Fuse Box(2)
1.Turn Signal Relay Fuse 7.5A
2.Spare Fuse 2A

Fuse Box(3)
1.ABS Motor Relay Fuse 25A
2.ABS Solenoid Valve Relay Fuse 15A

Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.SEL Button
7.Upper and Lower Button
8.Starter Lockout Switch

Relay Box
1.Radiator Fan Relay
2.Headlight Circuit Relay
3.ECU Main Relay
4.Fuel Pump Relay
5.Starter Circuit Relay

Starter Relay
1.ECU Fuse 15A
2.Main Fuse 30A

LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | Hazard Switch | | | Turn Signal Switch | | | Passing Button | | | Dimmer Switch | | | SEL Button | | | Upper and Lower Button | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | | | | OFF | | | Free | | | Upper | | | | Clutch Lever | | |
| Push | | | ON(Push) | | | | OFF(Push) | | | | ON(Push) | | | Push | | | Free | | | | Released | | |
| Released | | | | | | | Right | | | | | | | | | | Lower | | | | Pulled In | | |

IGNITION SWITCH CONNECTIONS

| | Battery | Ignition | Signal |
|---|---|---|---|
| Color | W | BR | BL |
| OFF LOCK | | | |
| ON | | | |

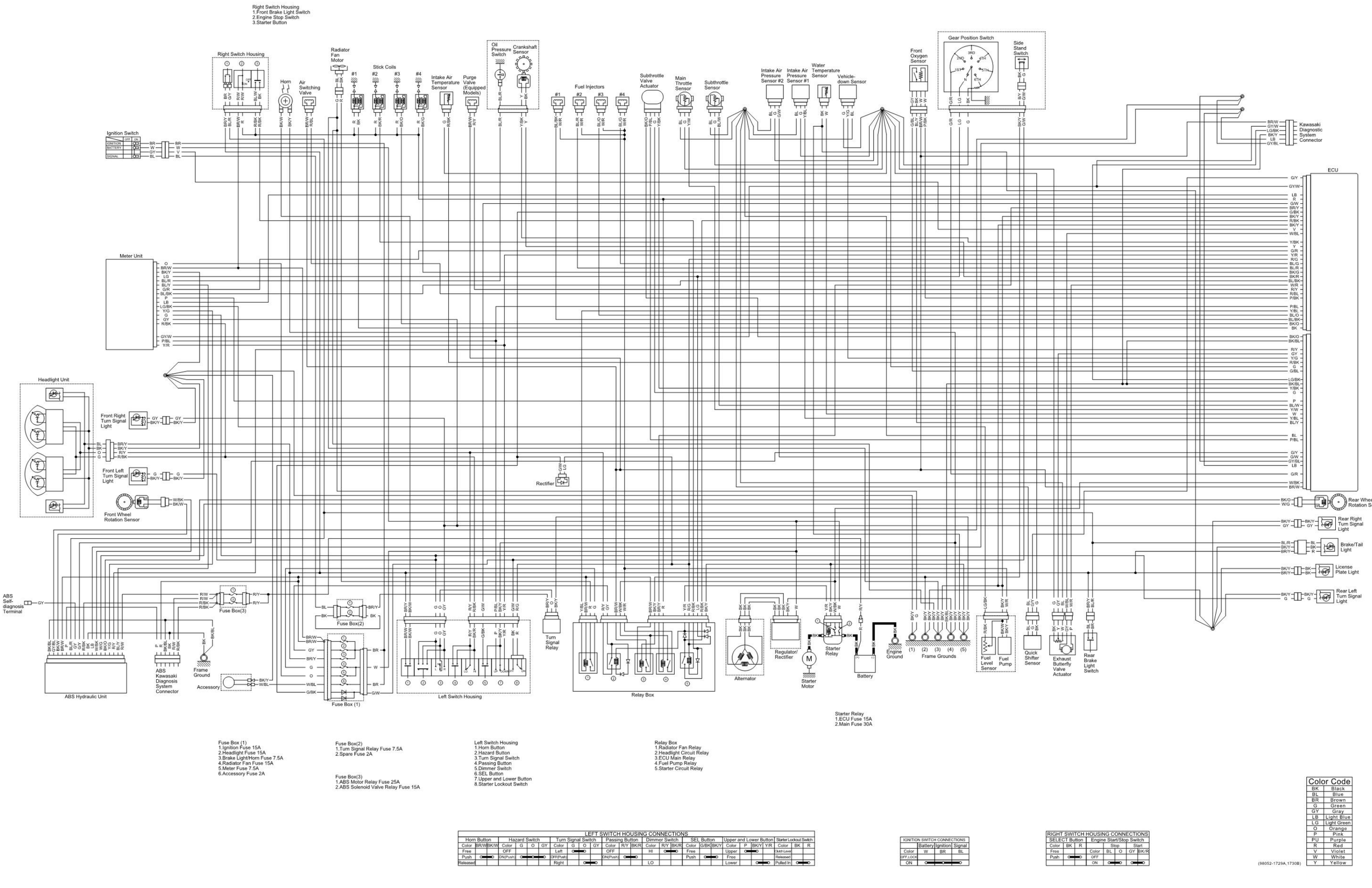
RIGHT SWITCH HOUSING CONNECTIONS

| SELECT Button | | | Engine Start/Stop Switch | | | | | |
|---|---|---|---|---|---|---|---|---|
| Color | BK | R | | Stop | | Start | | |
| Free | | | Color | BL | O | GY | BK/R | |
| Push | | | OFF | | | | | |
| | | | ON | | | | | |

(98052-1728A,1732A)

| Color Code | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

# ZX636J without Immobilizer




LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | | Hazard Switch | | | | Turn Signal Switch | | | | Passing Button | | | Dimmer Switch | | | SEL Button | | | Upper and Lower Button | | | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | | | | OFF | | | HI | | | Free | | | Upper | | | | Clutch Lever | | |
| Push | | | ON/Push | | | | OFF/Push | | | | ON/Push | | | | | | Push | | | Free | | | | Released | | |
| Released | | | | | | | Right | | | | | | | LO | | | | | | Lower | | | | Pulled In | | |

IGNITION SWITCH CONNECTIONS

| | Battery | Ignition | Signal |
|---|---|---|---|
| Color | W | BR | BL |
| OFF/LOCK | | | |
| ON | | | |

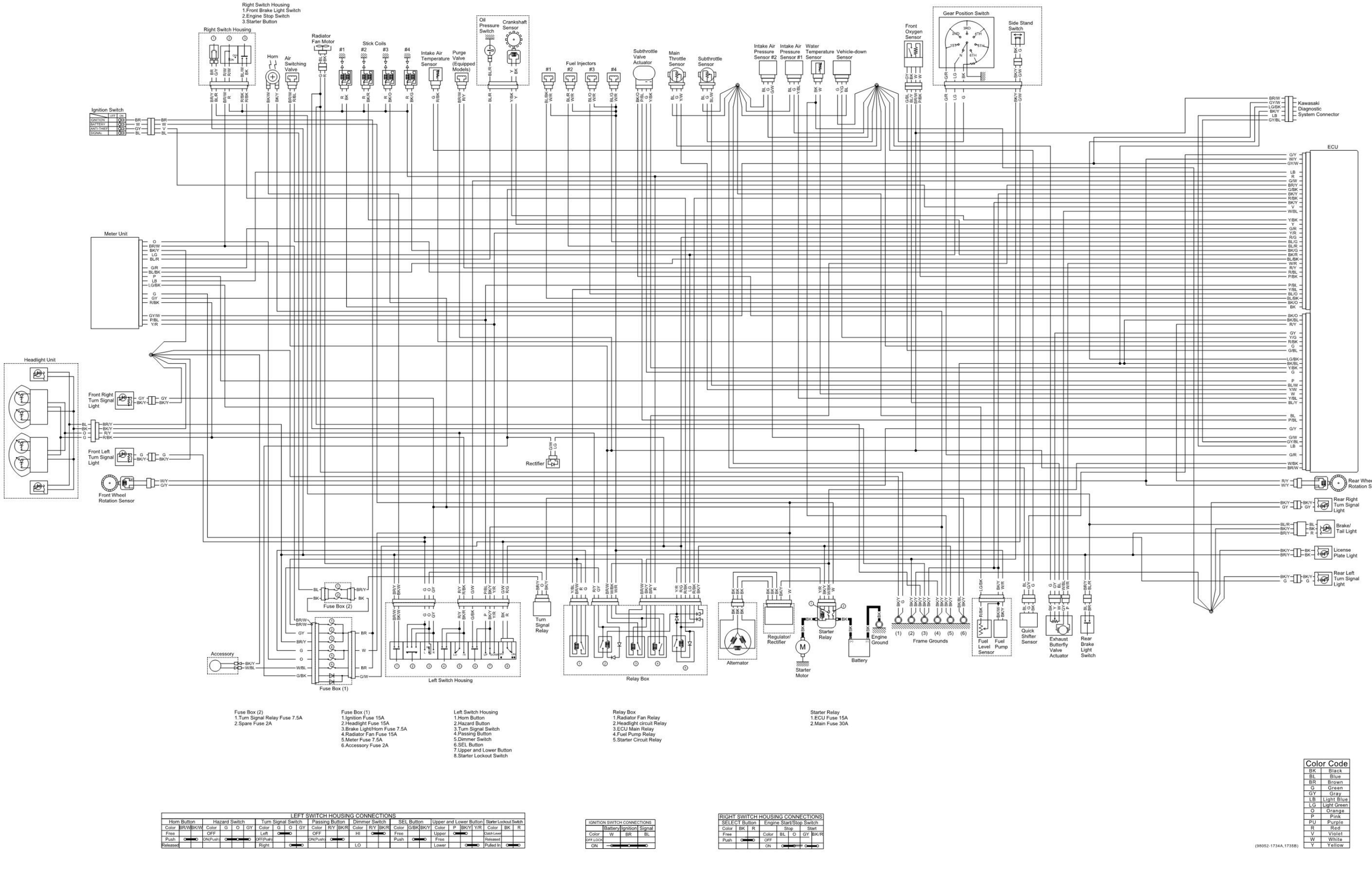
RIGHT SWITCH HOUSING CONNECTIONS

| SELECT Button | | | Engine Start/Stop Switch | | | | | |
|---|---|---|---|---|---|---|---|---|
| Color | BK | R | | Stop | | Start | | |
| Free | | | Color | BL | O | GY | BK/R | |
| Push | | | OFF | | | | | |
| | | | ON | | | | | |

| Color Code | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

(98052-1729A,1730B)

# ZX636K




Fuse Box (2)
1.Turn Signal Relay Fuse 7.5A
2.Spare Fuse 2A

Fuse Box (1)
1.Ignition Fuse 15A
2.Headlight Fuse 15A
3.Brake Light/Horn Fuse 7.5A
4.Radiator Fan Fuse 15A
5.Meter Fuse 7.5A
6.Accessory Fuse 2A

Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.SEL Button
7.Upper and Lower Button
8.Starter Lockout Switch

Relay Box
1.Radiator Fan Relay
2.Headlight circuit Relay
3.ECU Main Relay
4.Fuel Pump Relay
5.Starter Circuit Relay

Starter Relay
1.ECU Fuse 15A
2.Main Fuse 30A

LEFT SWITCH HOUSING CONNECTIONS

| Horn Button | | | Hazard Switch | | | | Turn Signal Switch | | | | Passing Button | | | Dimmer Switch | | | SEL Button | | | | Upper and Lower Button | | | | Starter Lockout Switch | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | BR/W | BK/W | Color | G | O | GY | Color | G | O | GY | Color | R/Y | BK/R | Color | R/Y | BK/R | Color | G/BK | BK/Y | Color | P | BK/Y | Y/R | Color | BK | R |
| Free | | | OFF | | | | Left | | | | OFF | | | HI | | | Free | | | Upper | | | | Clutch Lever | | |
| Push | | | ON(Push) | | | | OFF(Push) | | | | ON(Push) | | | | | | Push | | | Free | | | | Released | | |
| Released | | | | | | | Right | | | | | | | LO | | | | | | Lower | | | | Pulled In | | |

IGNITION SWITCH CONNECTIONS

| | Battery | Ignition | Signal |
|---|---|---|---|
| Color | W | BR | BL |
| OFF LOCK | | | |
| ON | | | |

RIGHT SWITCH HOUSING CONNECTIONS

| SELECT Button | | | Engine Start/Stop Switch | | | | |
|---|---|---|---|---|---|---|---|
| Color | BK | R | | Stop | | Start | |
| Free | | | Color | BL | O | GY | BK/R |
| Push | | | OFF | | | | |
| | | | ON | | | | |

Color Code

| | |
|---|---|
| BK | Black |
| BL | Blue |
| BR | Brown |
| G | Green |
| GY | Gray |
| LB | Light Blue |
| LG | Light Green |
| O | Orange |
| P | Pink |
| PU | Purple |
| R | Red |
| V | Violet |
| W | White |
| Y | Yellow |

(98052-1734A,1735B)

# MODEL APPLICATION

□:This digit in the frame number changes from one machine to another.

| Year | Model | Beginning Frame No. |
|---|---|---|
| 2024 | ZX636JR | JKBZXJJ1□RA000001<br>JKBZX636JJA000001 |
| 2024 | ZX636KR | JKBZXJK1□RA000001 |

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